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DATES AHEAD, ANNUAL MEETINGS.

Pennsylvania Gas Association, Reading, Pa., April 12, 13 and 14. For list of papers see JOURNAL, dated March 27.

Missouri Public Utilities Association, St. Louis, Mo., April 13, 14 and 15.

Southern Gas Association, Montgomery, Ala., April 19, 20 and 21. For list of papers, see JOURNAL dated March 27.

Southwestern Electrical and Gas Association, Houston, Tex., April 27, 28 and 29.

Oklahoma Public Utilities Association, May 9, 10 and 11.

Natural Gas Association, Pittsburgh, Pa., May 16, 17 and 18.

Wisconsin Gas Association, Milwaukee, Wis., May 17 and 18. For list of papers, see JOURNAL dated March 27.

Iowa District Gas Association, Clinton, Ia., May 24, 25 and 26. G. I. Vincent, Secretary.

BRIEFLY TOLD.

ANNUAL REPORT, GERMAN CONTINENTAL GAS COMPANY.—An interesting document is the Fifty-sixth Annual Report of the German Continental Gas Company, of Dessau, of which great corporation Herr William von Oechelhaeuser—well and favorably known to many American gas men—is the Director-General. The annual meeting of said Company was held on the 28th inst., and the "Report," of which we have received a copy by courtesy of the Director General, was submitted to the stockholders. A short review of the document may be of interest to our readers. The Company operates 18 manufacturing plants, that supply 82 districts, in connection with which the Directorate pays a handsome compliment to American long distance distribution practice, specially mentioned in the report. In addition to the gas works, there are also several electrical stations, a chemical works and meter factory complete, with machine shops and iron foundry, where the Company manufactures much of the apparatus required at the various plants. Interesting reference is made in the report concerning the vertical retort system of the well-known Dessau type, which is credited with having enabled the management to increase the dividend proposed to be paid as over that of former years, notwithstanding the price of coal was not less—if anything, higher—and coke sales had fallen off greatly owing to a mild winter. The dividend recommended to be paid was just 9 per cent.; surely, an elegant showing taken in connection with another statement, in which the electrical plants are quoted as having earned only 6 per cent. The increase in sales of gas was 6.06 per cent. over the previous year, and the net gain in profits was 7.77 per cent. The sale of gas for light alone also increased materially, although the incandescent and inverted gas mantle lamps had largely displaced the ordinary methods of illumination. The "Deutsche Continental Gas Gesellschaft" and its veteran, though ever-young, Director-General von Oechelhaeuser, may feel justly proud of their achievements, who also have our thanks for the copy of the report, and our compliments as well.

MEETING DATES, NATIONAL COMMERCIAL GAS ASSOCIATION.—The next meeting of the National Commercial Gas Association will be held in Denver, Col., during the week beginning October 23d, that date being the first day of the conclave. It will be noted that this is quite a pronounced change, the custom heretofore having been to hold the sessions the fore part (in fact during the first week) of December. The date selected, it may be further noted, is the Monday directly following the meeting of the American Gas Institute in St. Louis. This year the Institute's session days are Wednesday, Thursday, Friday and Saturday, the 18th, 19th, 20th and 21st days of October. This arrangement will enable those attending the Institute meeting to reach Denver comfortably by the morning of October 23d.

DEATH OF JAMES DUDLEY PERKINS.—With exceeding regret we chronicle the death of Mr. James Dudley Perkins, who passed away, at his home in New Rochelle, N. Y., the morning of the 27th inst. For half a century he was the leading gas coal factor of America, and a lovable personality endeared him to the heads and the rank-

and-file of the fraternity. He was born in Salem, Mass., in 1828, began his business career in Boston (1849), and in 1868 came to New York, where he helped to found the gas coal importing firm of Bird, Perkins & Job. He retired from active business perhaps 10 years ago. The funeral services were held at his late residence, 123 Woodland avenue, the afternoon of last Wednesday. Later on we will give an accurate, detailed history of his long, honorable and useful life.

DEATH OF MR. CHARLES WALLACE HUNT.—Another useful life, the worthy bearer of which was well known to the fraternity, was terminated the evening of the 27th inst., when death claimed Mr. Charles Wallace Hunt, in his home, on Grymes Hill, Staten Island, N. Y. The funeral services were held in the Church of the Ascension, West New Brighton, Staten Island, the morning of the 30th inst. Deceased, was a pronounced genius along inventive lines, one crowning achievement of his being the devising and perfecting of the Hunt Automatic Railway. We have in preparation the story of his life.

MARCH MEETING, CHICAGO SECTION, ILLUMINATING ENGINEERING SOCIETY.—The March meeting of the Chicago Section of the Illuminating Engineering Society was held in the Great Northern Hotel, "Chicago Room," on the 16th inst., with a very good attendance. After Chairman Pearson had called the meeting to order and Secretary Bernhard had read several notices, Mr. James R. Cravath read a very interesting paper entitled "Tests on the Lighting of a Small Room." He noted the fact that, while a good many tests had been presented to the Society on different types of illumination, in different places, there had been a remarkable scarcity of tests presented over the lighting of small rooms. The tests made by Mr. Cravath concerned a room 12 feet by 16 feet 6 inches, the ceiling height being 8 feet 6 inches. The ceiling was a very light cream in color and the side walls were covered with a light green paper. For testing purposes he took one quarter of the room, in which space he had 8 test stations. The tests were made with a 100-watt, nominal-rated, tungsten lamp, and the foot candle readings were recorded on a Sharp-Millar portable photometer. With a clear prismatic reflector over lamp at the ceiling he obtained an average of 2.03 foot candles, while a bare lamp at ceiling gave an average of 1.597 foot candles. With an opal bowl he obtained an average of 2.07 foot candles, and with an indirect light, using a bell-shape, corrugated glass, mirrored reflector, but dropped 16 inches from the ceiling, he obtained an average of 1 151 foot candles. An interesting fact brought out was the slight difference in efficiency, as between an opal ball or a roughed stalactite. The latter, at the ceiling, gave an average of 1.39 foot candles, and the 8-inch opal ball of same level gave 1.31 foot candles. The Cravath paper was followed by a very spirited discussion on the different points brought out.

MARCH MEETING, PHILADELPHIA SECTION, ILLUMINATING ENGINEERING SOCIETY.—The regular march meeting of the Philadelphia Section, Illuminating Engineering Society, was held on the evening of Friday, the 17th. The usual dinner, which was served in Green's Hotel, was attended by 20 members and guests. After the dinner the party adjourned to the Assembly Room of the Philadelphia Electric Company's building, Tenth and Chestnut streets. The meeting was presided over by Mr. William J. Serrill, and Mr. George B. Muth, Secretary of the Section, was present. The reading of the minutes having been dispensed with, Mr. Serrill introduced Dr. Herbert E. Ives, the speaker of the evening. The title of Dr. Ives' paper was: "Spectral Lines as Standards of Luminous Values." The lecturer stated that the subject of his talk was suggested from a talk given by Dr. Steinmetz on a "Three-Line, Discontinuous Photometric Standard." Dr. Ives stated that primary photometric standards may be divided into three classes: First, carefully selected commercial lamps, in which only the amount of useful radiation, or the part of the spectrums giving useful illumination, is taken into account; second, bodies having a continuous spectrum, which bodies, when raised to a stated temperature, give off a measurable amount of heat. Thus, the radiation of a black body, when raised to a stated temperature, might be taken as an example; third, bodies having discontinuous spectrums, in which the radiation converted into heat may be measured by an instrument such as the bolometer, while the amount of light given off by the substance may be measured by means of a photometer—it being necessary to make both readings at the same instant. The last mentioned standard could be divided into 3 classes: (A) Bodies giving a 3-line spectrum; (B) bodies giving a 2-line spectrum; (C) bodies giving a single-line spectrum. Standards giving either a 3 or a 2-line spectrum were not practical, for the reason that the radiation from each line, as well as the amount of light from each line, must be measured at the same time, which would be practically impossible. The mercury arc was an example of a body from which the green mercury line might be obtained, this line always being in the same position in the spectrum, and its wave length was always the same, thus insuring a never-changing standard. In calibrating a secondary standard from the mercury arc, as a primary standard, the same values could be obtained in every laboratory by having a large number of observers to read the bolometer and photometer, these instruments being read at the same time. Dr. Ives in discussing his paper showed quite a number of very interesting slides, starting with the primary colors, red, green and blue, and showing how their mixture is made white. In showing the color triangle Dr. Ives showed the location of the various artificial illuminants on the chart. Spectrums of various artificial lights compared with the solar spectrum were also shown, and from these was easily seen the great preponderance of red in the spectrum of the artificial light. Dr. Ives stated that, in the tungsten lamp, for instance. 95 per cent. of the energy was in the invisible part of the spectrum, only 5 per cent. of the useful energy being obtained in the form of light. The discussion following the paper was participated in by these members: Messrs. Serrill, F. H. Gilpin, Bond, Eichengreen, Fulweiler and Morton, the questions and answers being as follows: "How were the photographs, shown on the screen, illustrating the different colors of the various objects, obtained?" The subject of color photography is a rather lengthy one; but, to give a fundamental idea, the curves of the 3 primary colors were shown, and it was stated that different colored glass, calculated from these curves, was used in the camera. "How is the color triangle obtained?" The fundamental basis of this is the isosceles triangle, in which the sum of the perpendiculars from the 3 sides of the triangle is equal to the altitude. Dr. Ives then showed graphically how the various colors were located on the triangle. The meeting was very well attended, 81 members and guests being present.

MARCH MEETING, SYRACUSE SECTION, N. C. G. A.—The Syracuse Section of the National Commercial Gas Association held their March meeting on the 21st ult., and in more than one feature outdid themselves. The active Secretary, Mr. B. H. Atwood, arranged for a paper and a musical programme as well. Both gas and electric subjects are taken up by this section, and the paper on "Production Electric," read by Mr. Ralph E. Hecker, provoked a most interesting discussion. The music was provided by an orchestra composed entirely of men employed by the Syracuse Lighting Company, and their efforts certainly did not disclose the fact that it was their first appearance. There were over 150 in attendance, and in addition to the paper and the music there were refreshments in plenty.

MARCH MEETING, BOSTON SECTION, N. C. G. A.—At the March meeting of the Boston Section of the National Commercial Gas Association held at Wesleyan Hall, Boston, on the 22d ult., Secretary L. H. Hemenway arranged to have Mr. Geo. E. Harris, the New England representative of Messrs. Rathbone, Sard & Co., deliver a talk on gas ranges. Mr. Harris spoke entertainingly and convincingly as is his wont, and, of course, the subject "Gas Ranges," is one he is well able to expound. Refreshments followed and both were enjoyed by a goodly attendance.

"SCIENTIFIC COOKING WITH SCIENTIFIC METHOD.—This is the well selected title of a handsomely gotten-up volume by Mrs. Sarah E. Woodworth Craig, whose capability as a demonstratress of the artfu. practice of cooking by gas is abundantly well-known to the American fraternity. In-season and out-of season, Mrs. Craig has championed the use of this most tractable and beneficial of modern fuels, and much of the vogue which it has gained is due to her well-put efforts. That Mrs. Craig is a true gas fuel devotee is well attested in the fact that, "for instance," in Chapter II., which is given over to a general description of the cookery art, in respect to "The Fire," the authoress says: "There is not much to be said about the kind of fuels we are to use. Gas is the fuel of most households; and I find, in the country places where gas cannot be obtained, they are using gasoline." As to the making of savory dishes of many kinds the book fairly teems, and it also abounds in exact tabulated figures regarding quantities, ways of concocting, niceties of flavoring, and the like. Take it all-in-all, despite the many books of like nature heretofore on the market none other quite measures with this for completeness. The only condemnatory thing about it is the "Table of Contents," which, being concise, in that it is not too diffuse, is indexed in chapter series rather than alphabetically as to matters detailed. However, that is far from being a fatal objection. The selling price is $1, and its publisher is the Standard Publishing Company, of Cincinnati.

CURRENT MENTION—

THE Kentridge (Va.) Gas and Light Company, capitalized in $25,000, has been organized by Messrs. A. D. Hobgood and T. W. Ozlin.

As usual the annual dinner of the Managers and staff officers of the American Gas Company, held in the Bellevue-Stratford Hotel, Philadelphia, the evening of the 28th inst., was a most enjoyable reunion. Mr. M. W. Stroud was an effective toastmaster, and the speakers included Messrs. R. R. Van Horn, S. P. Curtis, J. B. Townsend, J. D. Shattuck (whose speech was all to the condiment) and H. S. Whipple.

THE Torrington (Conn.) Electric Light Company has authorized the Western Gas Construction Company, of Fort Wayne, Ind., to construct for it a gasholder up to 100,000 cubic feet capacity.

CERTAIN capitalists have applied to the authorities of Brenham, Tex., for the right to there construct a gas plant. They ask for a 50-year grant, and calculate that it will take at least $50,000 to install the necessary plant.

Inverted Gas Arc Lighting in Baltimore, Md.

[Prepared by Mr. Herbert K. Dodson, Commercial Agent.]

The field for gas lighting is to be developed to a much greater extent than formerly by the Consolidated Gas, Electric Light and Power Company, of Baltimore, and in order to interest the public in the possibilities of gas for store lighting, a new building recently erected in the heart of the shopping district was utilized by the Company to

display the results to be obtained through modern gas-lighting. On the first floor 24 Intenso arc lamps were distributed, and only the fronts of the four floors above were lighted. The building stood out as a pillar of light among the other stores in the block and compelled attention from passersby. The location is in the theater district and thousands of people use the thoroughfare nightly.

The front of the building is practically all glass and the lower floor had the appearance of broad daylight throughout its entire length and breadth. This sign was placed in the window:

DEMONSTRATION INTENSO GAS ARC.
NON-GLARE.
NO SHADOWS.
TRUE COLOR VALUES.
GOOD LIGHTING INCREASES BUSINESS.
Cost of gas per lamp per hour 1½ cents.
The Gas and Electric Company,
Lexington and Liberty Streets.

Two night photographs of the building are reproduced herewith, one showing the entire front, the other a detailed view of the ground floor, which were printed on a mailing card 9½ by 6¼ inches in size, headed, "An Example of Good Lighting," and bearing the inscription, "See it. You are interested in good lighting." This card was mailed to all those in the city who would be interested in the use of indoor gas arc lamps. The demonstration continued for a month. There was no cost for the use of the building, the owner readily seeing the advantage of such a display in renting his property.

[Official Report.—As Furnished by the Secretary.—Continued from Page 598.]

PROCEEDINGS, FORTY-FIRST ANNUAL MEETING, NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

First Day—Morning Session.

Appointment of Nominating Committee.

The President—The next order of business is the election of officers. What is your pleasure? I believe the usual custom—it is not a law, only as custom has made it so—is that a committee be appointed to bring in nominations.

On motion (seconded) the President was authorized to appoint a committee to name officers for the ensuing year, and the President appointed as such committee Messrs. S. J. Fowler, J. A. Gould and George H. Scranton.

The President then called the order of

General Business.

On motion of Mr. C. A. Learned, the calling of the roll was dispensed with, and the President announced that the paper list would be taken up.

READING THE PAPERS.

The President—The first paper we have is on "The New Coal Gas Works at Providence, R. I.," jointly by Mr. J. W. Ellis and Mr. Carroll Miller. The former will start it by reading the "Statement" respecting the causes which led to the new construction.

Mr. Ellis, in introducing

THE STATEMENT,

said: This statement is merely an acknowledgment that the Providence Gas Company, having a very ancient plant, was compelled by necessity to build a new plant, and in doing so endeavored to build a modern one. It will be for you, gentlemen, on a physical inspection and examination to-morrow, to form your own opinion, and to express that opinion, if you so choose, as to how well or how ill we have succeeded.

The Providence Gas Company built its first coal gas plant in the year 1848, the date of its organization, and continued to manufacture gas on this site, known as the "East Station," until 1870, being then obliged to abandon that location, as it was impossible to purchase any other land in the vicinity, and the plant was bounded by public streets. The output at that time was about 132 million cubic feet.

In the year 1870 property was purchased and a new coal gas plant built and put in operation, known as the "West Station," on the west side of the river. Water gas was installed at this location in 1891.

In 1878 the Providence Gas Company purchased the works of the Citizens Gas Company, which were built in the year 1877, and known as the "South Station." Water gas was installed at this station in the year 1890. The "West Station," recently known as the "North Station," was abandoned November, 1910, and the "South Station" is now being used and operated as a water gas station, the coal gas plant having been abandoned.

The management of the Company, on account of the impossibility of procuring more land in the vicinity of the "North Station," and the land itself being too valuable for its use in the manufacture of gas, decided to obtain a location of sufficient area for the future use of the Company, as the abandonment of the "East" and "North Stations" was due to insufficient facilities for extension of the business

of the Company. The Providence Gas Company was fortunate in obtaining a tract of land, located about 2 miles southerly from the center of the city, and bounded easterly on the harbor of Narragansett Bay, and westerly by one of the principal business streets of the city, having an area of about 40 acres. This land was purchased March 1, 1905.

Since the date of the purchase the Company has had under consideration many schemes and designs for the erection of works on this location, and a thorough investigation was made of all the present methods of gas construction in use. It was first decided to build a coke oven plant; but, after full consideration, it was decided that one coke oven plant in New England was sufficient. After an exhaustive examination of the most modern plants in this country, it was decided, January, 1909, to build a coal gas plant, with a system of Dessau vertical retorts. Contract was made with the Didier-March Company, of New York, the United States representative of the Stettiner von Fabrik Company, of Germany, for the construction of a retort house, from the crusher to the coke storage bin, this being a lump-sum contract, consisting of one-half of the capacity of the retort house. In February, 1910, another stack was contracted for, making the plant three-fourths of the capacity of the retort house. Contract was also made for all the other structures and buildings with the Bartlett-Hayward Company, upon a percentage basis.

Ground was broken about April 1, 1909. The Gas Company did all the grading and put in all the foundations of the buildings, with the exception of the power house, before December 1, 1909.

It has been the aim of the management to have all buildings, apparatus, structures and piping so designed and erected as to make them permanent in their construction, even at an increased capital cost, and to render the plant not only as durable as possible, but also to reduce the cost of maintenance to a minimum.

A large percentage of the cost of this construction has been incurred on account of the natural future increase of the Company, as well as future contemplated additions, such as water gas plant and additional coal gas plant. It is the intention of the Company to have the manufacture of gas centralized at this station.

Coal gas was made at this station in October, 1910, and at the present time only one-half of the retort house is in operation, but as soon as some of the details of operation, particularly in regard to the handling of coke, are improved, the third stack will be put in operation, as it is confidently expected by the management that a sufficient amount of coke can be sold in Providence and vicinity to warrant this amount of coal gas manufacture at this plant.

Detailed description, as well as the result of operation of this plant, will be given to the Association by our Engineer, Mr. Carroll Miller.

THE DESCRIPTION

of the plant, as narrated by the Engineer (Mr. Carroll Miller) then followed.

This plant, known as the Sassafras Point Station, is entirely new and is built on a piece of property containing about 40 acres, having water frontage on two sides: The Providence river on the east and a slip on the north. A railroad connection comes in from the west. Fig. 1 shows the general plan; Figs. 2 and 3, panoramic views of the works.

The plant is laid out as a 3,000,000 cubic foot unit, and all apparatus, with the exception of one stack of retorts, has been built for that capacity. By reference to Fig. 1, it will be readily seen how the coal gas plant will be extended and where water gas will be installed. There are no holders at this plant at present. When any are built, they will probably be located on the western portion of the property.

With a few exceptions, the general plan laid out by the Bartlett-Hayward Company was followed. Exclusive of the apparatus from the coal elevators up to and including the coke storage bin, that Company designed the buildings and furnished practically all of the ironwork for the apparatus and buildings. The Didier-March Company furnished the buildings and apparatus from the coal elevators up to and including the coke storage bin. The grading of the property, foundations, concrete and all underground work, were done by the Gas Company. It was necessary to drive piles for some founda-

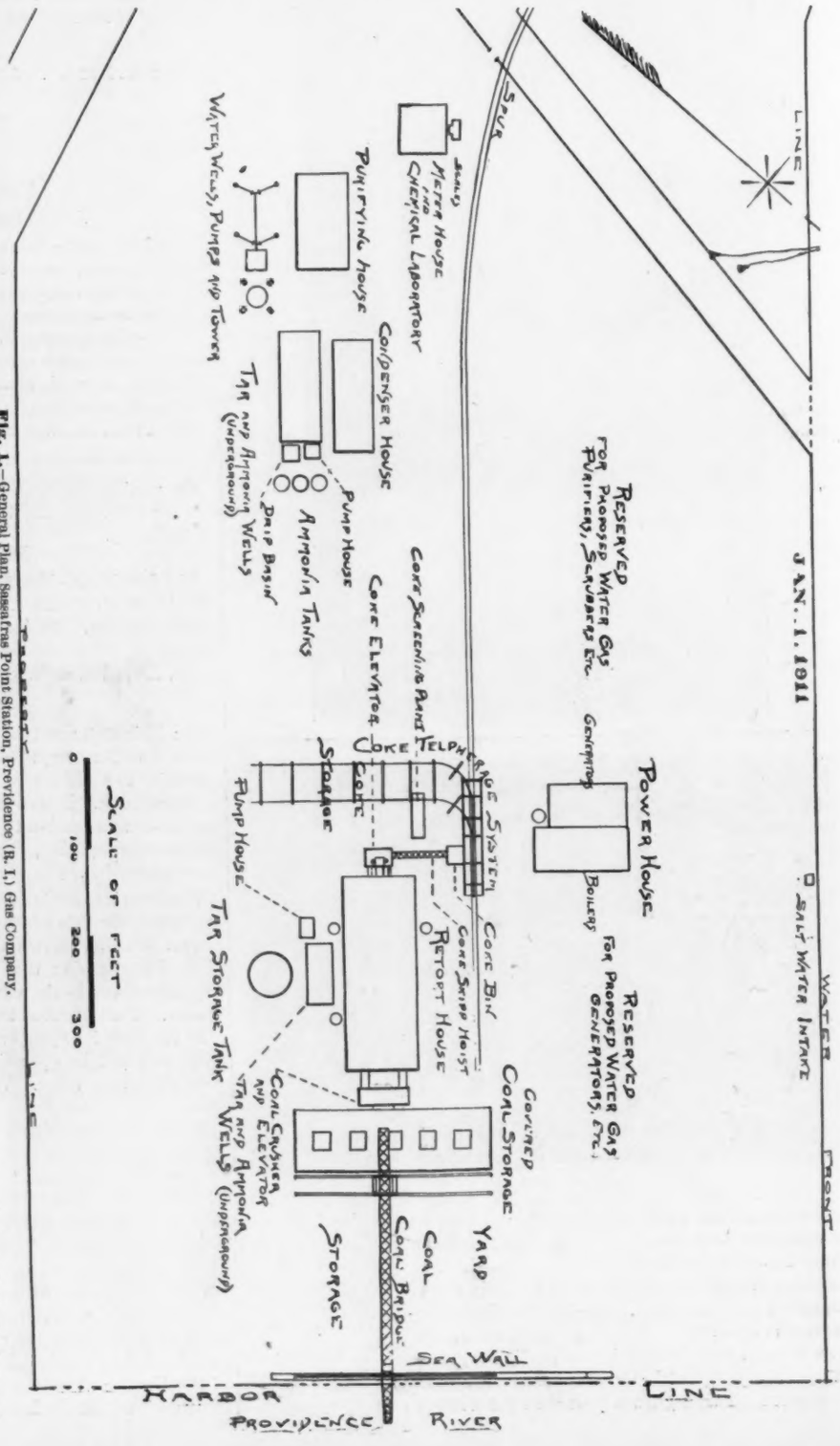


Fig. 1.—General Plan, Sassafras Point Station, Providence (R. I.) Gas Company.

tions, but for the majority of the structures none were necessary. From a hill on the south side of the property sufficient sand and gravel were obtained to make all the concrete used on the work. A large proportion of the hill was cut away to obtain dirt for filling and grading.

The work of dredging for the sea-wall foundation was started dur ing March, 1909; grading of the yard, April, 1909, and the excavation for the retort house foundation, May, 1909. The first stack of retorts was charged October 10, 1910.

Coal Storage Plant.—On the Providence river water front, the sea-wall, which is built of stone masonry, is 325 feet long and the depth of the water alongside is 26 feet at high tide.

The coal bridge, built by the Brown-Hoisting Machinery Company, has a capacity of from 100 to 150 tons per hour. A 2-ton clamshell bucket is used with this apparatus. One leg of the bridge runs on the sea-wall and the span from that point to the other leg is 311 feet. The trolley travel is 304 feet 6 inches,, and the total length over all is 324 feet 6 inches. The clearance of the bucket above the ground is 56 feet. The longitudinal travel of the bridge is 220 feet, giving an outside storage area for coal of 220 feet by 201 feet.

The coal shed, which has a capacity of about 8,000 tons, is filled from the bridge through hatches in the roof, or the coal may be dumped directly into the hopper, from which it is taken by conveyors into the retort house. For reclaiming the coal from the shed, two Dodge telphers are used, one running on each side of the shed. They are equipped with 2 cubic yard, clamshell buckets. The shed is entirely constructed of concrete and steel.

Coal Handling Apparatus from the Shed to Storage Bins in the Retort House.—From the hopper mentioned above, the coal passes through a weighing hopper, thence to an apron conveyor which feeds the crusher. From the crusher the coal is raised in a bucket elevator dumping on to a belt conveyor which feeds the bins. All machinery, from and including the weighing hoppers to the bucket elevators, is in duplicate. The capacity of each set of conveyors is 75 tons per hour.

Retort House.—The retort house is designed for 4 stacks, each containing 6 benches of 10 retorts. At present, 3 stacks have been built, 2 in the south side of the house and 1 in the north. The house, 215 feet by 80 feet, is of German design, and is built of steel with 8-inch brick, curtain walls. The retort installation is of the Dessau type and furnished by the Didier-March Company. The retorts are 13 feet 2 inches long, 22½ inches by 9 inches at the top and 27 inches by 14 inches at the bottom, and are designed to carbonize 1,100 pounds of coal in 10 hours or about 70 tons (2,240 pounds) per stack per 24 hours.

There is one producer for each bench, the size of the grates being 3 feet 4 inches by 4 feet. The total depth, from the grate bars to the charging door, is 18 feet, but as the producer gas is taken off at a point about 3 feet above the grate, that figure represents the effective fire depth, the remainder of the height being available for storing coke. The producers of the first two stacks are equipped with ordinary bar grates, but those of the third stack, which was contracted for nearly a year after the others, have "step" grates.

Coal hoppers are located above the benches and extend the entire length of the house. These hoppers will store sufficient coal for 36 hours' operation. The coke and breeze bins are located at the west end of the house.

Breeze, which is used for filling the bottom mouthpieces of the retorts, is charged with a measuring hopper suspended from an overhead track. The coal is measured in a similar hopper. Coke for charging the generators is conveyed from the bins in a hopper likewise suspended. Figs. 4, 5 and 6 show interior views of the retort house.

Coke Handling Apparatus.—The coke is discharged from the bottom of the retorts into a chute, thence to a hot coke conveyor. A line of conveyors on each side of the house is located to one side of the retort stacks, in order to keep the steam, given off by quenching, from ascending through the retorts to the charging floor.

These conveyors are of the de Brauwer type, built by the Link Belt Company, who furnished all other conveyors in the plant. The coke is quenched in the conveyor trough and is carried along to the end of the retort house, where it is dumped into an automatic skip-hoist, which in turn discharges into the storage bin, which has a capacity of 14,000 cubic feet. Coke for charging the furnaces is taken up in cars on a platform elevator situated at the west end of the retort house.

The skip-hoist and storage bin are of the same design as those in similar plants in Germany. The hoist is inclined at an angle of about 45°. There are 2 cars connected by wire ropes, 1 car going up full, the other descending empty, passing one above the other at the middle of the incline.

Fig. 4.

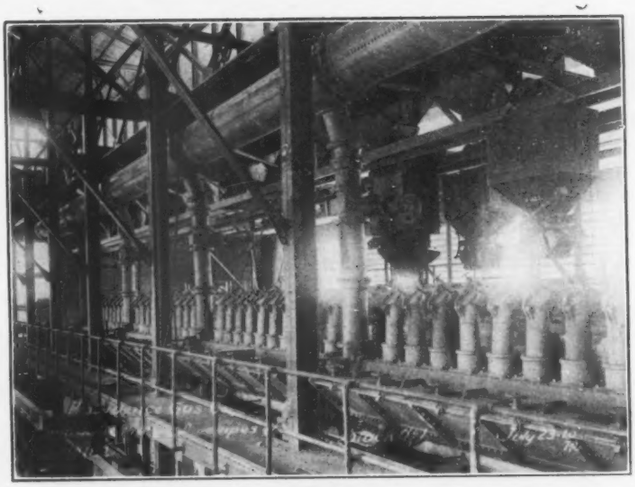


Fig. 5.

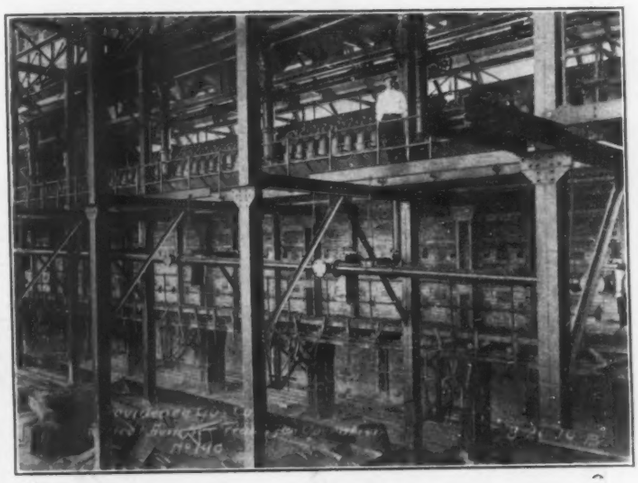
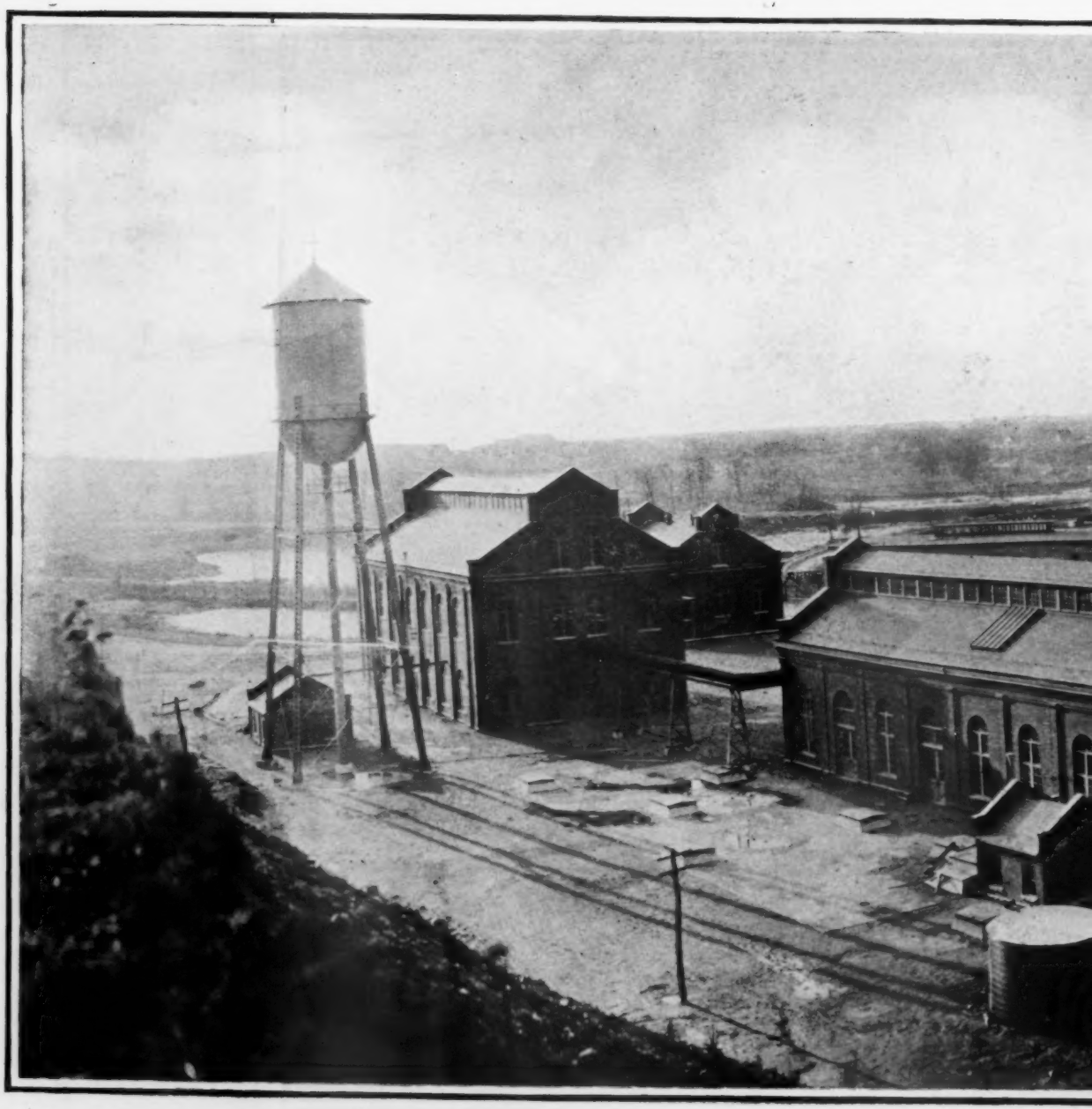


Fig. 6.

At each chute of the coke bin are screens designed to remove the breeze from the coke; the breeze collecting in a hopper lower down. Coke may be loaded from the bin direct to cars and wagons. A Dodge telpher, running on a steel trestle, the tracks being 54 feet above the ground level, takes the coke from the bin in a bottom-drop bucket, having a capacity of 160 cubic feet, and conveys it to the screening plant or to storage. Something over 5,000 tons can now be stored and the track system can be extended to increase the stor-



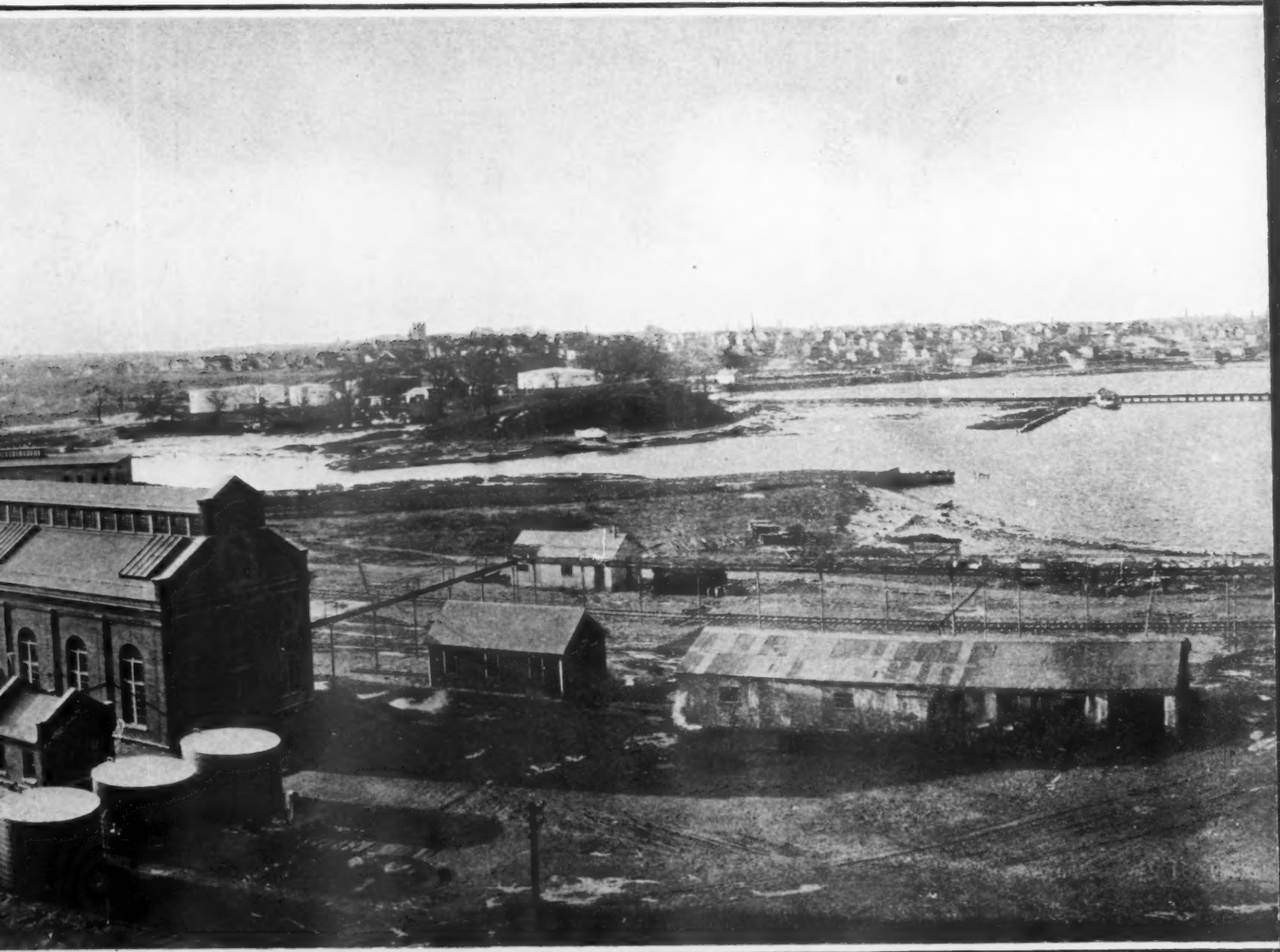
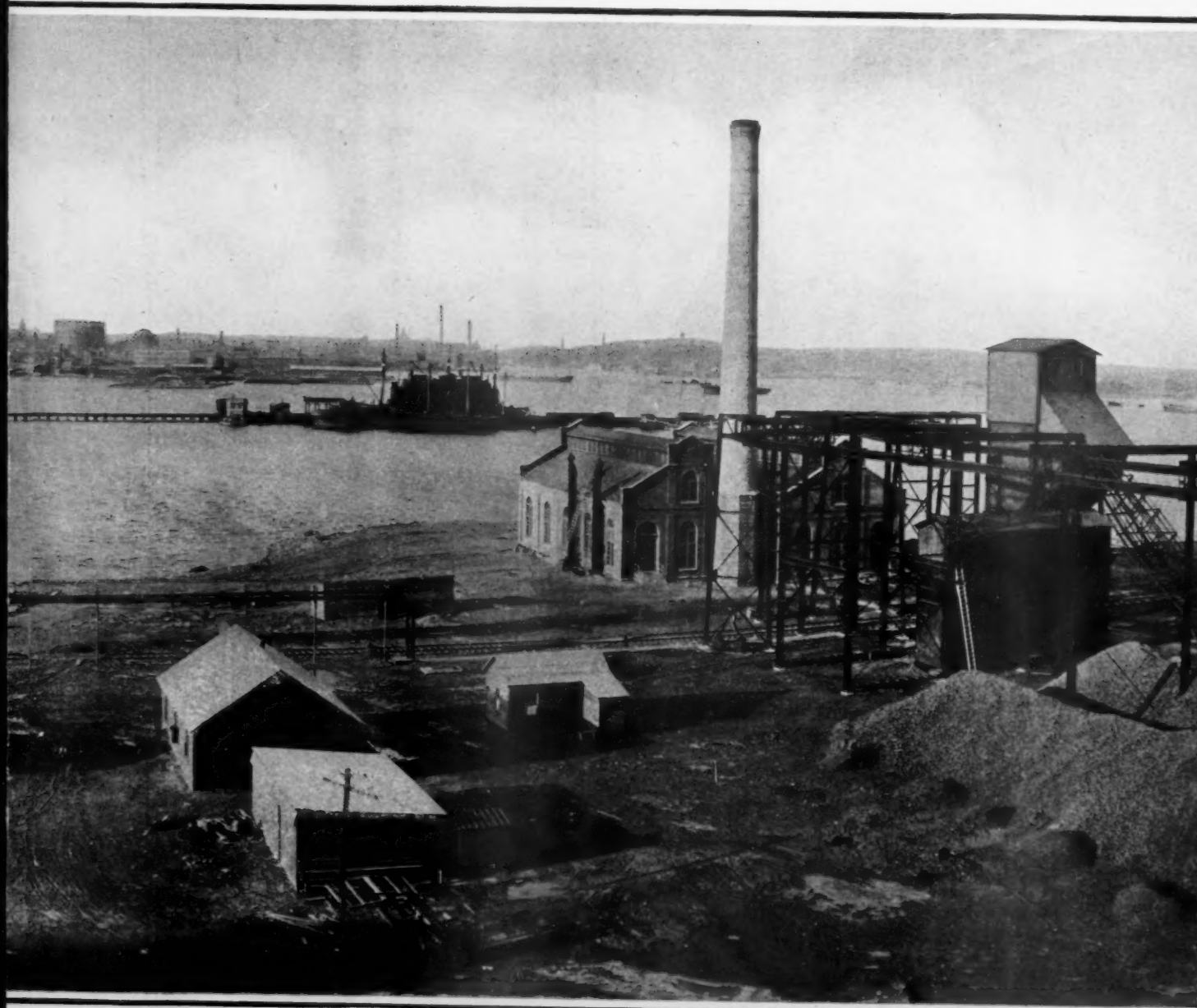
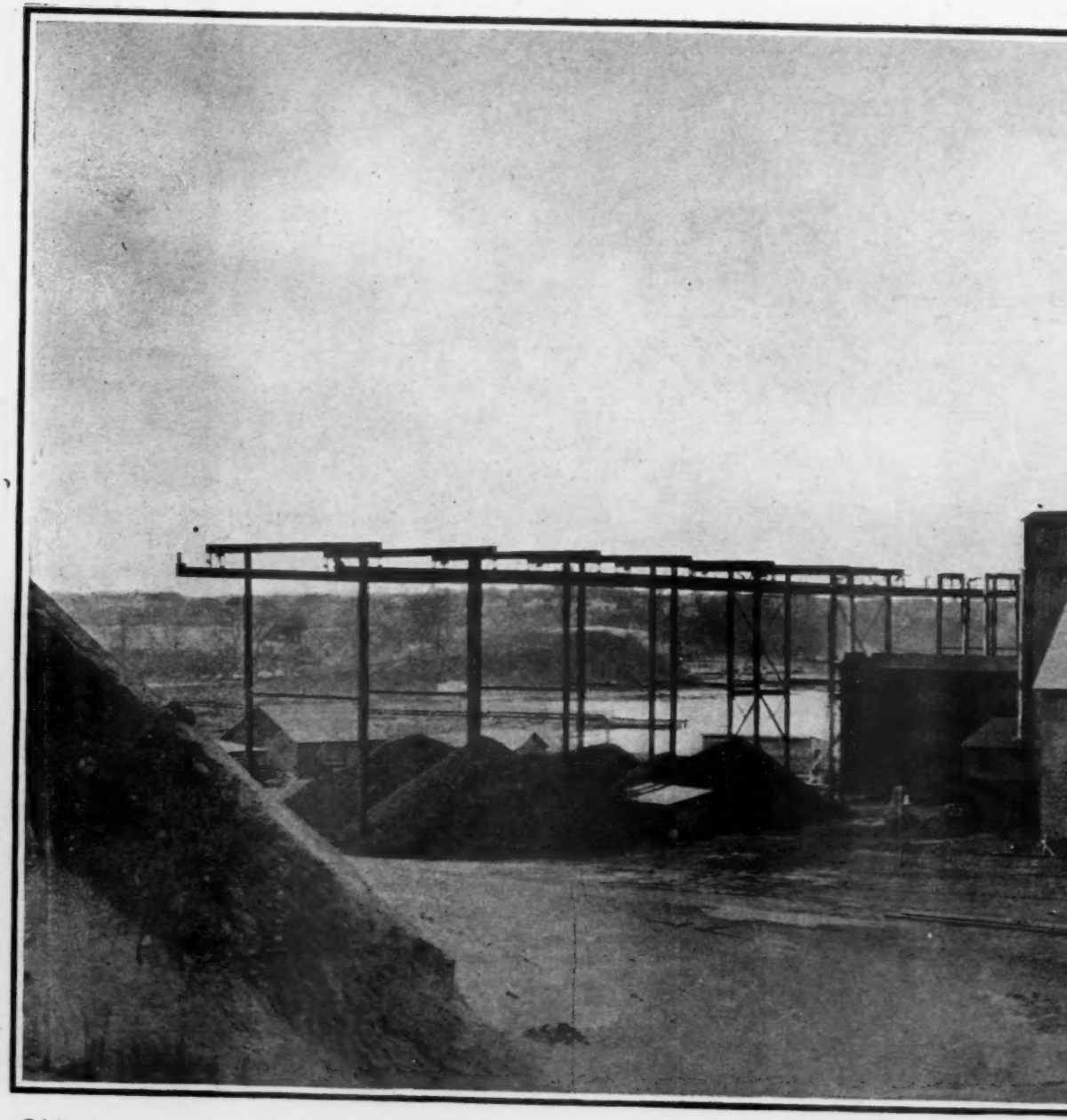


Fig. 3. SASSAFRAS POINT S



TATION. PROVIDENCE (R. I.) GAS COMPANY.



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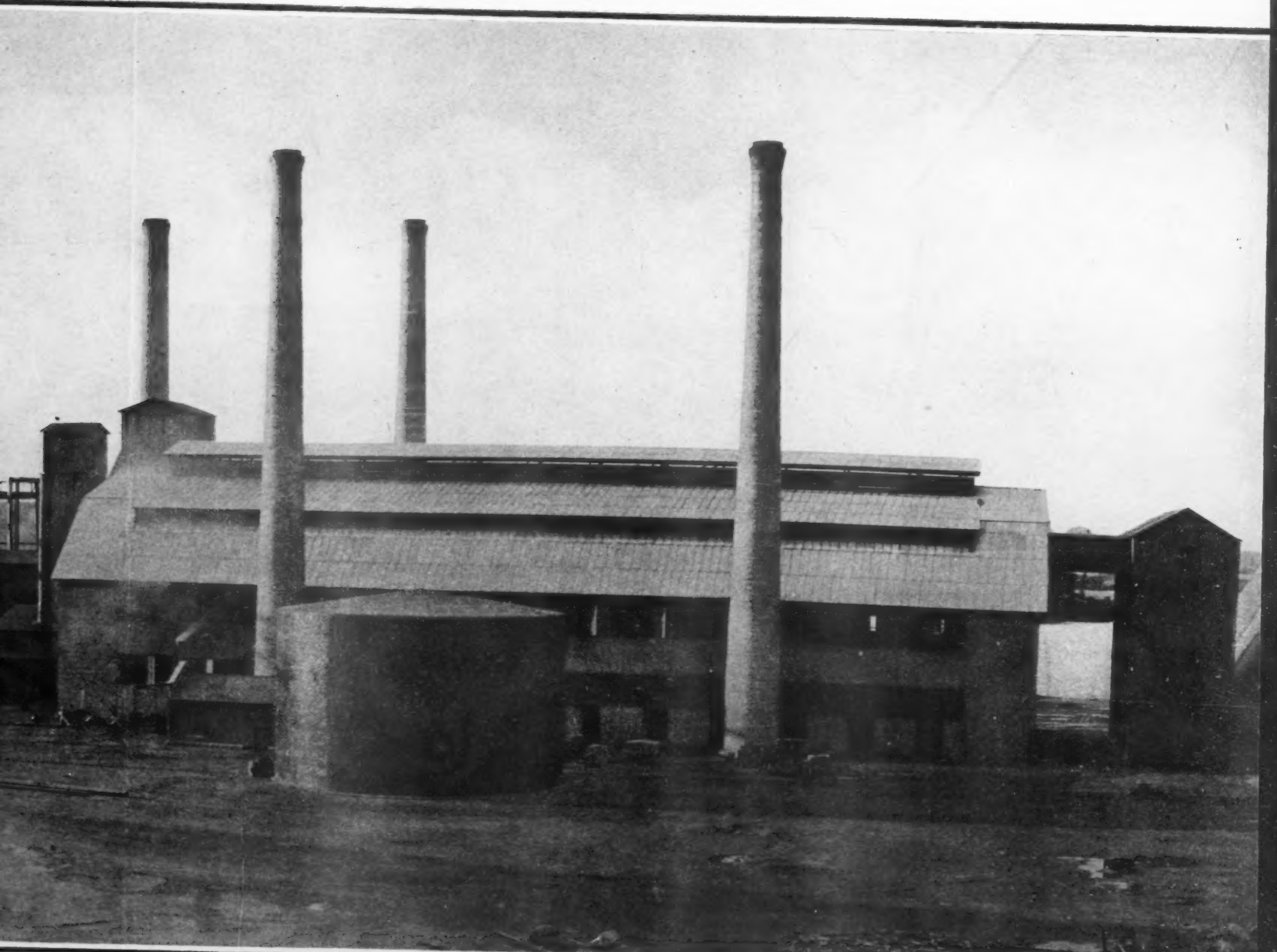


Fig. 2. SASSAFRAS POINT STATION, PROVIDENC

E (R. I.) GAS COMPANY.

age to any desired amount. The coke is fed into a hopper at the top of the screening building, thence through a roll crusher and on to a shaking screen. From the bins the coke may be sent through chutes into wagons or narrow-gauge cars. There are bagging chutes under the bins. Coke is reclaimed from stock with the same telpher equipped with a 2½-ton clamshell bucket.

A Hunt narrow-gauge railway runs from the coke storage bin and screening plant to the platform elevator and boiler house.

Condenser House.—This house contains, in the order named, 2 water-cooled, primary condensers, each having a cooling surface of 3,200 square feet; 2 Connersville, steam-driven exhausters, with Isbell-Porter governors; 2 P. & A. tar extractors; 2 secondary water-cooled condensers, each having a cooling surface of 6,000 square feet; there is then a space left for cyanogen washers which may also be installed in the future; 2 rotary ammonia washers. Tagliabue temperature regulators are used for both the primary and secondary condensers. The water overflowing from the secondary condensers passes to the primary. All connections are above ground and easily accessible. An overhead valve platform runs the full length of the house. See Figs. 7, 8, 9 and 10 for views of condenser house. Fig. 11 shows the gauge board built by D. McDonald & Company.

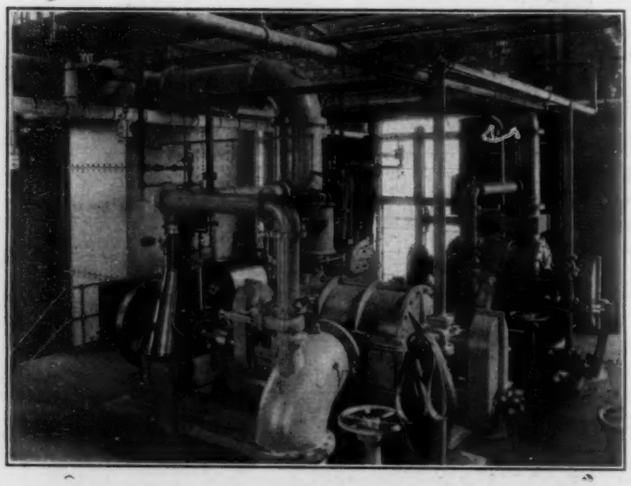


Fig. 7.

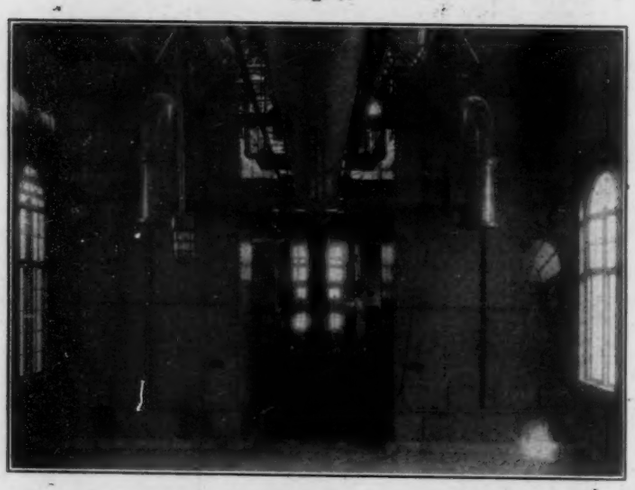


Fig. 8.

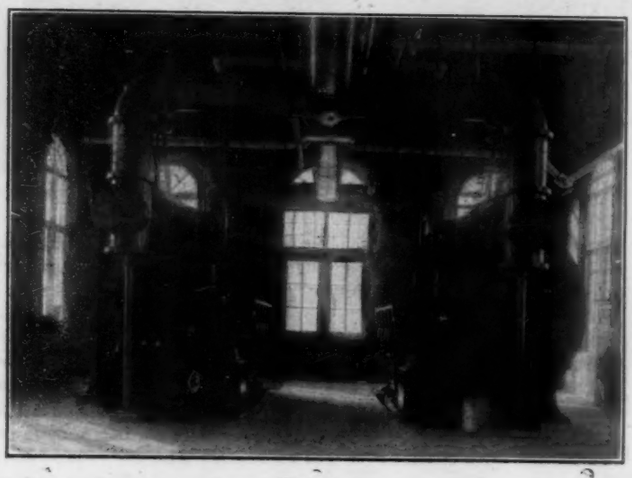


Fig. 9.

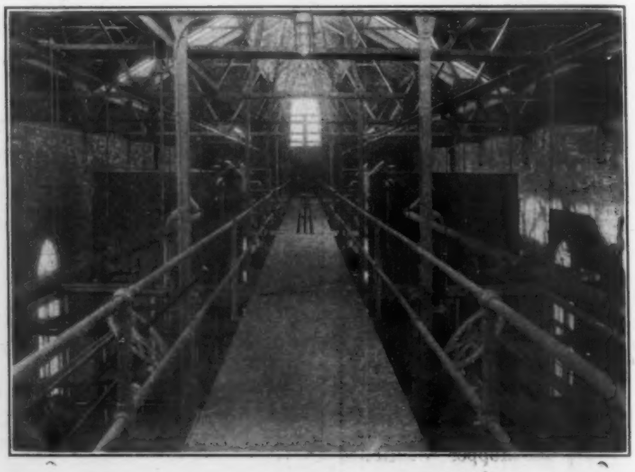


Fig. 10.

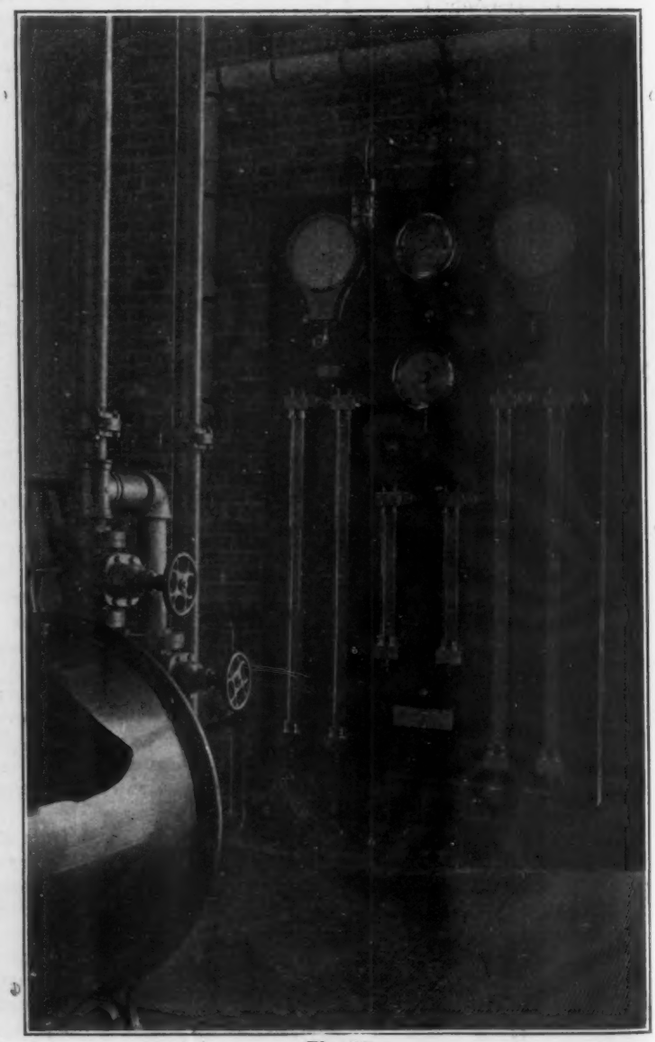


Fig. 11.

(To be Continued.)

[Abstract Report.—Continued from Page 600.]

SIXTH ANNUAL MEETING, NATIONAL COMMERCIAL GAS ASSOCIATION.

Held at Mechanics' Hall, Boston, Mass., Dec. 6th to 9th, 1910

Fourth Day—Morning Session.

The President hereupon resumed the Chair, and introduced Mr. H. L. Schutt, of New York, who read the following paper, narrating

A TRAVELLING SALESMAN'S VIEWS OF THE COMMERCIAL DEPARTMENT.

In travelling around the country, calling upon the different gas companies, one sees a good deal of their inner workings, and what little knowledge I have of the gas business has been picked up in this way. I am only too glad to tell it to you, and you can take it for what it is worth. If there is anything good, keep it and practice it; or if it does not meet with your ideas, as we say in the business world, "Cancel the order."

Gas companies are organized by capitalists for only one purpose, "dividends." The word, "philanthropy," I think, does not enter into the modern finance of the day. After the franchise is obtained, the plant built, the gas in the holder ready to deliver, the general manager is hired, and great care is taken in the selection of this man, because to him is intrusted hundreds of thousands of dollars' worth of property, franchise right and goodwill of the people. If lost, it is very hard to regain, for if a business enterprise is once called "black," that name is hard to lose. The man, as far as the individual company is concerned, is the court of last resort. He must be quick to see a proposition, true to his judgment, accessible to his employees, but not too familiar, willing to see his customers; in fact, an open book, so that "all who run may read." Granting that he is all this, he must be an organizer, a man able to surround himself with competent men whom he can trust, and able to feel that when he says to the head of a department, "do this," he can go away on some other problem and rest assured that his order is carried out. Like the general in the Cuban army, who told a subordinate to deliver a message to Garcia, satisfied that his subordinate would find Garcia and deliver the message, although not knowing where he was.

To my mind the commercial department is of the greatest importance. You can hire gas makers, you can equip your plant with all that money can buy, but if you have not an efficient and well organized commercial department, your vast expenditure of money, labor, etc., goes for naught.

Taking it for granted that you have the plant and the general manager, the first thing in the commercial department is an efficient head. This man must be one who can get business and organize a department of salesmen—solicitor is a name I do not like—salesman is what the man is who gets out and sells the goods. The head of a new business department must be a dispenser of enthusiasm and a co-worker with the salesman under his particular charge. When you get down to the root of the matter these five rules are the making of the salesmen or of any good business man:

1. Neatness. Shoes blackened, clean collar, clean shave each day, and general appearance of prosperity.
2. Knowledge of goods and propositions he is to present to prospective purchasers.
3. Willingness to work. No lazy person ever won success as a gas salesman.
4. Absolute truthfulness. All statements to customers about the goods absolutely so. No guesswork.
5. Enthusiasm; steam, hustle. That is what brings results. No clockworker was ever a success.

I would rather be like a chameleon. You have heard that story no doubt. One negro coming down the street met another with a chameleon in his hand. He said, "Sam., what are you going to do with that little lizard?" Sam. said, "I'm going to give that to my gal." About a week afterwards George met Sam. on the street and said: "I was down to your gal's house the other night and she didn't have any lizard on her at all." Sam replied: "There was something peculiar about that lizard. You know, if you put him on white, he turns white; if you put him on red, he turns red; and if you put him on black, he turns black. I took him down to Caroline's house, and she had on a Scotch plaid waist. I laid it on her and he busted his self tryin' to make good." In other words, if you cannot make good any other way as a gas salesman, "bust yourself."

Did you ever think the impression that the people of a city get of a gas company is through the attitude of the employees of that company toward the customer. A smile, a kind word, a willingness to look up trouble and explain the readings of a meter, or anything that pertains to any particular "kick" that a customer may come in about, makes a pleasant feeling, and the report soon travels around that that company is on the level and is trying to please. On the other hand, an indifferent attitude, an "in-too-much-of-a-hurry" manner about you in looking up anything, creates a bad impression in a community, and reflects not only upon the employees who come in contact with the customer, but upon the general management of the company. That company is soon in ill repute, and is made untold trouble in the way of franchise rights which entail legal expense and cut down the dividends for the owners, sometimes making the investment a failure.

Advertising should be done in a way not to see how much money can be spent, but how big returns can be obtained for the least amount of expenditure. A great deal of newspaper advertising is thrown away, because it is vague and does not hit the nail on the head. Here are a few suggestions for little locals:

1. Some things make you angry—gas ranges make you happy. Inquire at the gas company.
2. Breakfast bells. You do not have to get up two hours before breakfast if you have a gas range. For sale by the gas company.
3. Get the gas range habit. Happy homes and gas ranges mean one and the same thing.
4. You call your wife an angel. Who ever saw an angel shoveling coal? Get a gas range. For sale by the gas company.

Kicks.—You are not a kicker, if you kick when you have a kick coming, at least you are not a kicker as the term is commonly understood. When you call attention to a fault in our system of service, we consider you are conferring a favor, because you are helping us attain an end we are constantly striving for; viz., the best service humanly possible. Therefore, the so-called "kick" is really constructive criticism, and we recognize its value and appreciate it accordingly. Don't hesitate; let us hear from you.

These are enough to let you know what I mean under this head.

New methods of making public opinion favorable toward the gas company are frequently coming up in a certain city. President Taft was to speak at a dinner. No hotel could accommodate the hundreds that wanted to be at that dinner and hear the speech, and the problem that faced the city and the Chamber of Commerce was: "Shall we invite 200 and disappoint the thousands; or shall we give up the dinner?" Here is where the gas company stepped in and said: "Do not disappoint any one. Get the armory. We will furnish a stove and fuel for the dinner; no charge." They sent one of their new business managers to the foundry, had the stove made in sections, and the men stayed on the job until the stove was shipped. They got it in place, the dinner was a success—some 1,100 people were served—and the gas company received many columns of advertising that they estimated was worth $1,000. They also took the stove and sold it, thereby coming out even on the deal. Now, what is the result? In that city every one in the Chamber of Commerce, and as you know they are the influential men in every city, boosts for the gas company, and the company can get anything, within reason, wants from that city.

There should be a complete understanding between the sales department and the foreman in charge of installing appliances, so there may be absolute certainty that, when a salesman sets a time for installing any appliance which he has sold, the work will be done at the time agreed upon. It should be your aim to give your customers as little annoyance as possible. You do not want to start in with a new customer and promise to do his work at a certain time and disappoint him. It is very disappointing to a housekeeper to be told that a stove will be set at a certain time, have her stay home all day expecting it, and then not keep the appointment. In my judgment, this is a very poor beginning for one to make with a new customer, and an equally bad policy with an old one. You should be sparing of promises, but when one is given, see that it is carried out to the letter. You should endeavor to let all prospective customers understand you are working for their interests, that yours is secondary, and show, by your enthusiasm and thorough knowledge of the subject, there is no question as to the validity of your statement.

It is only in recent years that men representing the gas industry realized the necessity of sending out salesmen to get new business, and it is without doubt a hard matter to get men who are competent to fill this important place. When you do get the right men, you should do everything you can to give them all the help at your com-

mand, freely consulting with them, and furnishing all the information possible that will be of assistance to them in securing business.

As I said before, the fitting department should be head-and-shoulders to the wheel with every department; in other words, all pull together. Oftentimes a chance remark dropped by a fitter makes a red-hot complaint at the complaint department. Never advance your own opinion, unless you absolutely know. Be pleasant, agreeable, and as neat as you can. Be careful of the kitchen floor and table, for these are tender spots in a good housekeeper's heart. How often have I noticed grease spots, black rings and dirt left by fitters after connecting ranges and water heaters. A paper spread on the floor only takes a minute and a little care makes a good housewife a booster. She has no dread of your coming, and it leaves a pleasant feeling, if you have been careful and neat in your work, and it makes it much easier for a salesman to sell goods the next time she needs anything, for she knows from previous experience that no unnecessary muss or litter is made.

That the industrial appliance branch of the commercial department is an important one is shown by the large number of gas companies that are now taking it up. Several years ago the New Haven Gas Light Company decided to thoroughly canvass all factories, to find out just what could be done toward installing appliances. In about 2 years there were gas appliances in over 60 factories, and gas consumption in these places had increased several millions cubic feet per year. One factory, said to be the largest hardware firm in this country, had one japanning oven in operation. The mode of operation was crude and slow, heating by mixture of coal and gas coke. The ovens were filled during the day, and at night the fires were started. The goods were baked all night and taken out in the morning. Only one bake was possible in 24 hours, and there was no regulation of heat. Many articles were defective, and the finish was dull. Permission was asked by the gas company to install gas burners in one oven at the gas company's expense. If not satisfactory the gas company was to remove same at 30 days' trial, and, if the actual finished work was not greater than by the old methods, to rebate the difference. Permission was granted, and they installed burners in one oven. At the end of the trial period the superintendent reported that one oven was hardly a fair test, and wanted to try out gas in 6 ovens. Five additional ovens were fitted with gas and were accepted. Finally the entire battery of 22 ovens was using gas. This was a cold, hard, business proposition, as costs at this factory are figured to the fraction of a cent. With gas, they were able to produce, when necessary, three complete batches of finished work in 12 hours, as compared with one in 24 hours, under the old methods. The work was far superior in finish, the color, uniform, and actual costs for fuel and labor for 1,000 pounds of finished material were less with gas for fuel than when coal and coke were used.

In this case, the gas company furnished the burners at cost, while the factory installed them. The actual consumption measured on 2 meters, each of 250-light capacity, was between 3,600,000 and 4,000,000 the first year. In another factory, the gas was used for treating steel. The Burnard pliers are made at this factory, and gas bills average over $100 per month. Still another uses gas for hardening, tempering and annealing all of their pipe-cutting wheels. This work brings in about $50 each month.

These three examples are given merely to illustrate three kinds of work which are being done to-day, cheaper and better with gas than any other fuel; namely, japanning, treating high-tempered steel, and hardening low-grade steel. So look around to see if there is not something of this nature of work in your town.

The subject of maintaining a gas arc, and other gas lighting appliances, is one that has been by most managers considered of minor importance, but with the more efficient competition, due to the advanced methods of lighting by electricity, the maintenance of these lamps of all kinds, which you have or hope to have in service, is a matter of very great importance. As it becomes more important, and the necessity for close competition naturally develops, we are forced to give it greater attention in an endeavor to increase the efficiency of the light without a corresponding increase in cost.

Your hope for success in this field is in giving the consumer at all times and under all conditions the very best service and results possible to provide. A gas lamp of whatever character, as you all know, is only efficient when kept in the highest state of perfection. It has many adverse conditions to contend with, and, among these, the first and most important consideration is the cleanliness of the glassware. Without clean glassware no lamp can prove satisfactory to the consumer, and this item more especially holds good where the new prismatic globes are used, as the slightest settlement of dust or dirt will reduce efficiency to a much greater degree than it does with a plain, smooth globe.

Of course, it is not necessary for me to refer to the importance of keeping up the mantles, and cautioning you as to the proper regulation of the gas and air to prevent carbonizing or blowout. All of you who have pushed this business, in times past, have in service lamps of the upright arc type, and this lamp, while not so high in foot candle power efficiency as the new inverted type of burner in arc lamps, still has its place, and will continue to be the proper lamp for a great many purposes. The inverted type of lamp is, however, coming rapidly to the front, and will, in a large measure, supersede the upright arc; and, at the same time, owing to the smaller cost of operation and higher efficiency, make new fields for gas lighting. In fact, it has already done so, and to prevent the loss of the upright arc, which you have at present in service, it should be handled on a different plan, in places where upright arcs have been put out on rental basis.

In the city of Bloomington, Ills., on November the 1st, last, they had 663 upright arc lamps. At this time they began pushing the inverted fixture. On May the 1st they had sold 203 clusters, but had only reduced the total number of uprights in service to 603. You will understand that those inverted clusters were sold, and while they still have upright arcs on hand, and will put them out on a rental basis, they find that, in a great many instances, it is perhaps slightly easier, certainly much more satisfactory, to sell the inverted fixture on a long-time payment, for (by this method) they secure a long-time contract for the maintenance of same, thereby preventing the possibility of the care of these lamps passing into other hands, at least until such time as it will have been clearly demonstrated and proven to all that they are cheaper than your competitive electric light and much more satisfactory.

When it comes to laying down hard-and fast rules for the conduct of a maintenance department, I am rather at sea. This, as well as almost every other branch of your business, is necessarily influenced to a great extent by the personality of the man who comes in actual contact with the consumer. The first step toward a successful maintenance department, from every point of view, is the selection of the man with this personality, and upon him rests the entire responsibility. He is in much the same position with respect to the public as the complaint man. There is nobody who can make more friends or more enemies for your company. There is no half-way about either one of them. They are either good or bad, and, like the "little girl with the curl," they are either very good or very bad. A courteous, tactful, efficient maintenance man is a treasure to anyone attempting to extend his lighting business. In the matter of costs almost as much depends upon this man as does the feeling of the consumer towards the company. He can, by carelessness or ignorance, ruin more mantles in 1 day than would ordinarily be broken in a month, just as he can, by throwing a match on the wrong floor, make an enemy of perhaps your best customer. He can do more to retard your progress in this line than 10 satisfied, non-complaining consumers could overcome in a month. So, you smokers, be careful where you throw your matches. You chaps that go out and put up mantles, remember that the housewife does not like litter on the floor.

The Denver, Rochester, U. G. I. and Public Service Companies, the Susquehanna Railway and Light Company, the Consumers Gas Company, of Toronto, and, in fact, all companies, are awakening to the fact that the new business department and publicity are the proper things to get business, and these companies have large, well organized new business departments and publicity bureaus.

"Ideals are like stars. You will not succeed in touching them with your hands, but, like the seafaring man on the desert of waters, you choose them as your guides, and following them you reach your destiny, which is success."

Smile, look happy and get busy. That makes positions sure, prospects bright for advaneement and dividends for owners. Try to work along the line of all-gas kitchens. It is not much more work in selling a range to persuade the owner to put in a water heater. Then you have an everyday consumer.

I am a firm believer in dividing the territory of a city into districts A, B, C and D, according to the number of salesmen you have, each one working his own territory, turning in his prospects each night, and making a thorough canvass of that territory. Then I believe in switching B to A's territory and A to B's, and so on down the list, then each man has new territory at all times to work.

I thank you for your kind attention. I know all here are of the

enthusiastic sort. Put your shoulders to the wheel as one man, each department working for the one purpose, "increased business," and success will be yours. "Success comes only to that man who has his ear close to the ground, listening for opportunity's footsteps."

Discussion.

Mr. Kennedy said that while listening to Mr. Schutt's paper he had been not only pleased but edified. It showed that Mr. Schutt had devoted much thought to the subject, and had given them the benefit of his observations in clear, concise language. As to the value of a commercial department, its efficiency must be judged by its results. As proof of this, attention was called to the rapid growth and popularity of this department throughout the country, all going to show that the hustling, tactful representative, solicitor, salesman, or call him what you will, is a money-getter. That the public gets an impression through the office force of a light company might be true, but he would go further to say it must be backed by a thoroughly efficient working force; by the best that money could obtain. The result in the home, shop or store, was what they were ultimately judged by. The "glad hand" would be forgotten long before the unpleasantness of installing an appliance by an inefficient workman had faded from the mind. The workman was after all the man behind the gun; the man who delivered the message to Garcia. More and more the man with the hands was coming to the front. Newer education was recognizing the fact that education must be of the hands, as well as the head, which accounted for the phenomenal growth of manual training. In a light company, or for that matter, anywhere else, there was no place to-day for "a middling workman." The world was calling for the best. Snappy, original advertisements attract attention, desire is aroused and sales are made; but the best of all advertisements is a contented consumer. A consumer always had friends. Every sale should be like a pebble, so aimed as to create ever-widening ripples on a sea of business success. To know the value of time was also of the greatest importance. Promptness and quickness (not haste) were appreciated by the general public, especially by the busy housewife.

Mr. Schick said the paper by Mr. Schutt was extremely interesting, and a careful study of it would bring forcibly to mind what environment could accomplish in the matter of coloring viewpoint. As he read the paper, it resolved itself into a very flattering compliment to the commercial departments of gas companies generally. In the main he agreed with Mr. Schutt, although they differed about a point or two. On page 5 Mr. Schutt refers to advertising; he thought No. 3 made the mistake of claiming too much, something, by the way, they should never do. Gas ranges might be found in homes that were *unhappy*, but the income derived was nevertheless acceptable. The gas range *helped* to make a happy home, but it was obvious that other things were necessary, too. As to the suggestion that the coal man could easily get back at them by asking, who ever saw an angel using a gas range? The laugh would be on the gas man. Referring to salesmen in districts, he was not inclined to believe in the general switching scheme suggested, for he did not think their friends would agree with it either if his Company adopted the plan. If so, it went without saying that Mr. Schutt could, and would, advance many convincing arguments against the plan, and the points he would of necessity make were entirely too obvious to require extended remarks with reference to them, and they would be quite as forceful against indiscriminate solicitor-switching because there was very little, if any, real difference between the objective of the solicitor and that of the traveling salesman.

The president said he was sorry it would be impossible, in the short time they had, to here discuss Mr. Schutt's excellent paper, but any discussion which any one had in mind could be sent to the Secretary and published in the Proceedings. He then introduced Mr. John H. Norris, who read a short paper on

GAS ENGINES FOR POWER.

I have taken the above title for my paper with the idea that the members of the National Commercial Gas Association would be particularly interested in a paper of that character. During my 23 years' experience with gas engines, I have seen the American market for gas engines grow, from a very small, toddling infant, into lusty manhood, and I look for it to keep on growing and increasing in a much larger ratio than it has done before.

The use of illuminating gas in engines has been the nucleus around which the gas engine has grown, and without which it would have been impossible to have made it the success which it has now become.

In my early experience with the gas engine, we looked on a 5-horsepower engine as a large machine, and the demand for it in those days was for driving fans, for cooling and ventilating purposes, for running ice-cream freezers and small pumping plants; in fact, the field that is now taken by the small electric motor. The development of the gas engine, from these early, crude attempts into the satisfactory prime-mover which it is to-day, started about 20 years ago, and there has been steady improvement in design and construction since that time.

In the years 1895 and 1896, the concern with which I have been connected developed a method of attaching a generator to a hit-and-miss gas engine that made the direct-connected gas engine plant a success in electric lighting, and the design of the machine then worked out has been carried forward, with slight improvements, ever since that time. The machines built at that time would furnish one-horsepower on 20 feet of 630 B. T. U. gas, so-called. As all you gentlemen are aware, B. T. U.'s in gas manufacture at that time were subservient to candle power, and the B. T. U. value was estimated from an occasional analysis made by the chemist of the gas company furnishing the gas.

Since that time, by improvements in the design and construction of the gas engine, it has been possible to reduce this consumption in moderate-sized engines to a consumption, under good working conditions, of 9500, or less B. T. U.'s per brake-horsepower hour. With such a record, it seems to me the average manager of a gas works is not doing himself justice if he does not do his utmost to install engines using gas for power to as large a degree as his distribution mains will allow him to furnish gas.

The gas engine to-day is being used more and more in cities where the gas works management has appreciated the advantage of the gas engine for increasing the quantity of gas consumed and averaging up the consumption of the gas works. In other words, the gas works management should, in my opinion, work just as hard for a day load for their plant as does the manager of an electric plant, so as to increase his output during the periods of otherwise light consumption, thus getting a greater return without any increase of capital or of operating expenses. In some of the larger cities of the country, notably Boston, Chicago, Milwaukee, and St. Louis, there has been an intelligent effort on the part of the gas companies to install gas engines and keep them running, with satisfied customers, as far as possible. I do not know what number of gas engines there may be in use in Boston at the present time, but the Boston Consolidated Gas Company is one of the most energetic companies in the campaign for installing gas engines, and is the only gas company which has made it a business to install gas engine power-plants of good size, using illuminating gas as fuel.

In Chicago, where an energetic campaign is being carried on by the People's Gas Light and Coke Company to install gas engines for power, it has been reported to me that there are, approximately, 500 gas engines working on illuminating gas and paying bills of $10 per month or over to the gas company. They have a number of 65- to 100-horsepower engines working there, and there is an aggregate of 5255-horsepower that averages approximately $15 per month. The reported cost of fuel on illuminating gas in Chicago is $4 per horsepower per month, a month representing 234 working hours, and the information I have received is as follows: "If gas engines were all equipped as they really ought to be, with compression suited to the gas, this average maximum would be much lower." If the gas engine makers and the gas companies would only realize the advantages of gas for power, then the number of engines in use would be very much increased and the average cost per horsepower per month would be reduced.

Now, as to the uses to which the gas engine is being put at the present time, I might say one of the earliest uses of the small gas engine was to enable the confectioner to use power in making ice cream, and this use alone is so great that probably 80 per cent. of the ice cream made in the United States to-day is made by power furnished by gas engines, and the large majority of them run on illuminating or city gas.

Some of the early installations made by the concern with which I am connected were for operating elevators, and these plants have been running for the last 18 years. The use of the gas engine for this purpose has been superseded by the electric current, owing to the fact that street current is easily accessible, and also the improvements in the electric elevator have been so great that the electric current is a most satisfactory power to use for this purpose.

Another use to which the gas engine is being put at this time is for refrigerating purposes, and one of the best examples of the reliability, and satisfactory running of the gas engine as built to-day is the fact that a single installation can be put on a refrigerating plant and run continuously for over 3 months, night and day, with short stops of a duration necessary only to lubricate and clean up the engine.

A recent plant here in New York was installed for a large publishing company, the installation being of 350-horsepower in two units, direct-connected to generators and using city gas.

In another case, a manufacturer using power from a street circuit was paying at the rate of 3 cents per kilowatt hour for power and 10 cents per kilowatt hour for light. Owing to the company he was buying from being absorbed by the local Edison Company, he was confronted

with the prospect of a raise to 5 cents per kilowatt hour for power and 12 cents per kilowatt hour for light. His bills for power and light under the lower rates were $120 per month. We installed a 35-horsepower gas engine for him, and his bill, with $1 gas, was only $64 per month; the engine running a generator and furnishing both power and light.

In another case in New York city, a small manufacturing establishment was paying $150 per month for power and lights. After installing a 25-horsepower engine and 15-kilowatt generator, his gas bill averaged only $54 per month, a saving of over $1000 per year.

In another case, an engine of 65-horsepower is running on approximately two-thirds load, with a consumption of 17 feet of New York city gas per brake-horsepower hour, or approximately 1½ cents per horsepower hour.

Within the last few years there have been built some stations for fire protection service, in which gas engines of large power have been direct-connected to pumps furnishing water at high pressure, which is distributed through mains in the parts of the cities most liable to disastrous fires, and the gas engine has shown exceptional adaptability for this work. In Philadelphia they have some stations equipped in this way, the figures of which I have not at hand, but there is, at Coney Island, a station equipped with three 185-horsepower engines direct-connected to 1500-gallon pumps, all 3 of which engines can be started within 90 seconds from receipt of the alarm and full pressure obtained at every point on the pipe line within less than 2 minutes from the sending of the alarm. In this plant at Coney Island, they have set up hydrants with revolving nozzles at the intersection of the streets, so that a stream of water can be thrown upon a burning building at any point within 250 feet from the hydrant, of sufficient volume to drown out any incipient fire that may have started, even among the inflammable wooden buildings that are generally built at such amusement resorts. The figures for the operation of this plant are as follows:

Cost of the Pumping Station.

Building	$10,000
Equipment	37,000
	$47,000

Operating Expenses Annually Are.

Labor	$13,140
Supplies and repairs	897
Fuel	150
	$14,187

And here I would like to say that there has been less trouble and considerably less expense with the gas engine operated fire protection plants than there has been with the electrically operated fire protection plants.

The gas companies are using the gas engine for gas boosters for distribution purposes, as you are all undoubtedly aware, and among some of the other uses are the following: Running printing offices; store lighting, using gas to make electric lights; running machine shops; woodworking shops; bake shaps; musical instrument factories; candy factories; gas meter manufacturers; pumping plants of all kinds; sewing machines; roller coasters; packing machinery; silk mills; powder mills; foundries; church lighting; and last, but not least, furnishing the blast for incinerating furnaces in crematories.

The President then called upon Mr. Norman Macbeth to read his paper on

ILLUMINATION.

Mr. Macbeth introduced his paper by remarking that the time and occasion reminded him of a story told by a preacher in the south, who had the reputation for long discourses. One evening, while proceeding with his usual sermon, the sexton tiptoed up and laid a note on the desk, which read, "When you are through turn out the lights and put the key under the mat." I assure you I can take care of the lights, gentlemen, and if you desire the key, it will be found in the usual place. However, seriously, considering it is approximately the lunch hour, and that you are desirous of getting through, I would like an expression of opinion from those present as to whether I shall merely abstract the paper and show a few slides, or show the slides only. In that event I assure you I won't occupy you here more than 5 or 10 minutes.

The President said he thought they had plenty of time for the Macbeth paper.

Going on, Mr. Macbeth continued the reading:

The title of this paper is broad enough to cover the entire lighting field. It is not the intention, however, at this time to take up more than a few points which the writer deems of importance.

In preparation for this paper, your President requested that investigations be made of open-flame burners and mantle lamps, and it is along these lines that most of the work has been done. It may appear that work of this character at this time is largely unnecessary. Surely there is little we can learn about open flames that has not already been told many times, while the mantle lamp problem has been before us for 20 years. On investigation, however, the writer was unable to find consistent reports, especially bearing on the ordinary burners and at pressures up to 8 inches of water.

Furthermore, in view of the enormous increase in light production possible with the incandescent mantle lamps, it is hardly conceivable that the old open flame, with an efficiency not greater than one-fifth of that with the mantle lamps, would at this time be worthy of our attention. Considering, however, that it has been reported on very good authority that 98 per cent. of the gas lighting in Germany is with mantle burners and 66 per cent. in Canada, while the reports for this country rarely exceed 15 per cent. of the gas outlets installed, we are forced to the realization that the flame burners are a factor worthy of attention. Quite recently the writer was asked the question, "Why are so few mantle lamps used in this country?" and the only reasonable answer was based on the opinion that this deplorable condition was due to the general inactivity of the gas companies. The mantle lamp business has been largely in the hands of the dealer, the peddler, and the department stores, and had it not been for the very considerable value back of incandescent mantle lighting and the appreciation of that value by consumers generally, there would be very little gas lighting in use to-day. Gas consumers realize and appreciate the good value and quality of illumination possible with incandescent mantle lamps, and while many cheap mantles and lamps have been sold, there is little doubt that you can get more than the value of your money in good gas lamps, if the other kind is worth half what you pay for them.

To say that gas companies have not been generally and fully interested in gas lighting is a bold statement which many would feel free to contradict, if same were made by our electric competitors. When we consider, however, that the gas business in this country has been perfected for the last 50 or 60 years, but that it is only within the last 3 or 4 years at the outside that the gas companies have been opening showrooms and installing appliances and lamps to show their consumers what may be secured, that burner maintenance, in the large residence field particularly, consists largely of cleaning out or changing clogged open-flame burners, that salesmen familiar with the lighting problem are still more rare, and up to this time have been largely more interested in selling gas by the cubic foot rather than on the broader basis of service, we must agree that there is quite a difference which side of the argument you may take.

It can be rather clearly shown that the predominance of open flames in residence work to-day is largely due to those companies who either countenanced and encouraged this condition, or overlooked their own and their consumers' welfare, and by the fixture manufacturers and many householders who prefer the flame burners because our mantle lamps are too large, and in many instances because the light from the mantles generally supplied has been too near a white light. For rest, relaxation and comfort, we undoubtedly prefer a lamp which is richer in the red and orange rays. It might be interesting to know that mantles can be secured having a color, which, when compared with the light from a 4-watt carbon filament, makes the carbon filament appear like white light.

For years we have been told that the color of the light from a mantle burner was the most disagreeable of the artificial sources, also that an artificial source to be satisfactory should produce a light having about the same color value as daylight. Scientific investigators have shown and proven rather conclusively that the light from the "greenest" mantle which can be made is nearer daylight and has a higher "white light efficiency" than any of the commercial gas or electric lamps at present on the market, with the exception possibly of some of the electric arcs using special carbons and color selective globes. It has also been generally admitted that the lower the specific intensity, or intrinsic brilliancy, of the source, the better that source is both from a commercial and hygienic standpoint. The highest rating which can possibly be given to an incandescent mantle lamp will hardly exceed 80 candle power per square inch, yet the lamps which our electric friends are advertising and endeavoring to introduce have a rating of 1000 candle power per square inch.

The old story—the vitiation of air bugbear—has been pretty well dissipated, and, so far as heat is concerned, there should be little difficulty in taking care of that also, to our distinct advantage. In fact, systems, which will later be referred to, are to-day in use where the heat from the products of combustion is made use of in improving the

ventilation of the room supplied with gas illumination, and even in one case where the illumination is largely with electric lamps.

There is also another factor coming in here which is at least worthy of consideration. Frequently, instead of capitalizing our product, we have done our best to depreciate it by telling how cheap it was. American appreciation is largely influenced by capitalization, the dollar is most frequently the hallmark of quality. That gas radiants are ever on the defensive is due to their comparative cheapness, like the boarding house prune, which we have been told is one of our most valuable fruits, but which is kept off the tables of the rich, who suffer physically thereby, solely through its inability to win a classification under the head of a luxury.

It has actually been stated of consumers in natural gas towns, where the gas was supplied at about 25 cents per 1000 cubic feet, that many of them preferred to use electricity for illumination because they lacked the nerve to call at the gas company's office each month to pay their bill of 15 or 20 cents for the entire month's lighting service. This condition is to a greater or lesser extent present in all cities where artificial gas is used to-day. Many students of this subject have been convinced that the general backwardness of the subject of gas illumination is not so much due to its poor quality, but to its high quality. The comparatively high efficiency from coal pile to effective gas illumination encourages a careless regard for results. If the gas companies believed that their existence depended more largely upon the lighting side of the business, more attention would be paid to this subject, and correspondingly better results would be secured.

Illuminating engineers must pay attention to the hygienic side of illumination, and one of the particular problems which we have always with us is the conservation of the eyesight of our clients and customers. Many of you may have had the experience where you have tried to tell the consumer that such and such a lamp in a certain position over his books or desk would ruin his eyes, because of the intensity or the direction of the light, and that it would be but a short time when, instead of wearing one pair of glasses, he would be wearing two of them. You have generally had the experience that the man will look at you and say, "Well, I guess I know what I want."

A very peculiar piece of information came to the writer's attention some time ago—that radiant heat will interfere considerably with the growth of human hair. A short time afterward, a case came up where a consumer desired that a lamp be placed directly above his head. He worked not only on his desk, but also on a table just behind his chair, and it did not require any very deep knowledge of the subject to know that the direction of the light which he would secure, if the lamp was placed in this position, would not be satisfactory, because the positions of the desk and the table were such in relation to the light rays that his head would always cast a shadow over his work. Noting that this customer's hair was somewhat thin, the possible use of this radiant heat information was naturally suggested and he was told the story about radiant heat and hair. There was no further discussion, only an understanding was reached that the lamp was not to be placed over his chair. It is seldom indeed that we may have the pleasure of using arguments which take so quickly and which are as effective. You may remember, then, that while you may be discounted on statements made regarding the care of the eyes, consumers will not take any chances with their hair. It might be in order to state here that the well authenticated cases of loss of hair were with electric lamps and not gas lamps, as might be assumed.

There has been a great deal of misunderstanding generally on this question of heat. Aside from all questions as to how much of the heat is radiant and how much is carried off in the air currents, that is, convected, it is a very simple matter to determine the total amount of heat liberated by either gas or electric lamps. With either of these lamps, the luminous efficiency is so low that practically all the energy may be considered as effective heat. The total heat from the gas lamps will, of course, be the product of the consumption in cubic feet per hour, and the heating value of your gas in B. T. U. per cubic foot; while with the electric lamps the calculation may be determined by the wattage of the lamps at their calorific value of 3410 B. T. U. per kilowatt hour.

With gas at 600 B. T. U. per cubic foot, hard coal 14,000 B. T. U. per pound or 875 B. T. U. per ounce, a lamp consuming 3.3 cubic feet per hour will liberate 2000 B. T. U. per hour, which is equal to a piece of coal having a weight of 2.3 ounces. A lamp running 4½ feet an hour will liberate 2700 B. T. U. per hour, or equivalent to a piece of coal weighing 3 ounces. An open gas flame running 8 cubic feet per hour will run 4800 B. T. U., equivalent to 5½ ounces of hard coal.

Therefore, in the production of light from an ordinary gas lamp, consuming from 3 to 4 cubic feet of gas per hour, we are liberating that quantity of heat equivalent to the combustion of 2 to 3 ounces of hard coal, or approximately a cube of coal 1½ inches square, if this combustion is prolonged over one hour. If the combustion should take place in 5 minutes, it would liberate that quantity of heat equal to the product of 12 gas lamps in the same time. As heating experts, we would not consider this system very efficient nor would we be likely to attempt to heat a room with a small cube of coal suspended 6 or 7 feet above the floor, and yet, they say that we can heat a room most wonderfully with a gas lamp.

Generally speaking, we should not permit the reading of electrical advertising to influence us beyond our better judgment. Good advertising men—those who get results—are deep students of psychology, as may be noted in the following abstract from an electric fan ad.: "If they do not have the effect of actually reducing the temperature, they will at least create the illusion of coolness, which acts in the most favorable manner upon your customers, your employees and yourself;" or from a portable lamp ad.: "Cool green shades, a warm-weather specialty;" and that with an electric lamp which may be placed in a position to deliver more radiant heat on the person of the purchaser than a gas lamp which would be equally effective from an illumination standpoint with less radiant heat. Some very excellent and interesting matter on this subject of the radiant heat from gas and electric lamps was given by J. G. Felton and E. J. Brady at the recent Illuminating Engineering Society convention. There was also a point of interest to gas men brought out in that paper—that the radiant heat in the lower hemisphere from a mantle burner when used without glass is 83 per cent. greater than when the burner is equipped with glass. This is the point which should be of particular value in discussing gasoline installations where bare mantles are so frequently used.

As has been stated before, undoubtedly much of the heat argument, which you find so hard to meet, comes from the general association of "where we have light we have heat." "Dark and cool" is more often associated with cellars and cold-storage warehouses than with stores using gas for illumination. Illumination is more often overdone with gas than it is with electric lamps, and as consumers do not generally carry illuminometers around with them, we must undoubtedly suffer by not getting credit for the amount which has been delivered.

We have a well-known, fully established law to the effect that the sensation is proportional to the natural logarithm of the stimulus. This means that with a change in intensity from one to two foot-candles, or from 2 to 4, the same change in sensation would be effected as if the intensity was increased from 10 to 20 foot-candles, or from 20 to 40, and so on. Perhaps there are some gentlemen here who may be disposed to believe that they are the exception to this law, as they will not only undertake to look at a lamp and pass an opinion as to the quantity of light which it is producing, but will also agree that they have the faculty of being able to carry a brain impression of that quantity of light and compare it with that from some other lamp which they may see a day or even a week later.

Illuminating engineering is after all a matter of the right lamp for the right place, and as the places are different, so should the kinds and sizes of lamps be different.

Had we but one lamp to consider, it would take us but a short time, when by experience we would know its possibilities, when, where and how to use it, and all the illumination problems would be very simple ones indeed; however, if the number of our lamps equaled the number of places, the problem would indeed be a more complex one. A few years ago the illuminating engineer was undoubtedly capable of improving installations of many of the light sources on the market. The day is fast approaching when this field will be considerably divided, and there will be epexrts on arc lamps, on single lamps, on various kinds of electric lamps, on daylight, in office buildings, in spectacular lighting, in street lighting, and so on.

Also, were the question only one of efficiency of light generation, the matter would be much simplified, and we would merely purchase that lamp which could show the greatest light output per unit of energy input. The real efficiency, however, is the efficiency of utilization, the ratio which a given quantity of light delivered to a given place bears to the total. The larger this factor the better; in practice it may range from .8 or 80 per cent. to less than 10 per cent.

We can readily conceive of a lamp having a high initial efficiency, that is, mean spherical candlepower per cubic foot, but which, because of its unfavorable light distribution characteristics, may not be as desirable a unit as another having half that initial efficiency.

From this general introduction, the report on open-flame and burner characteristics under various pressures will be taken up.

On investigation it was found that of the gas sold for illuminating purposes in this country, by far the greater amount was water gas, mixed coal and water gas, and straight coal gas. Of the two straight gases, the water gas was more largely used, and, inasmuch as investigations on a mixed gas would possibly be true only for that particular

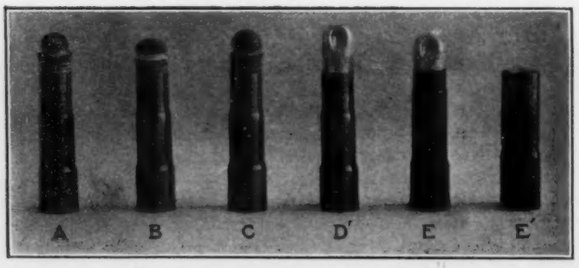
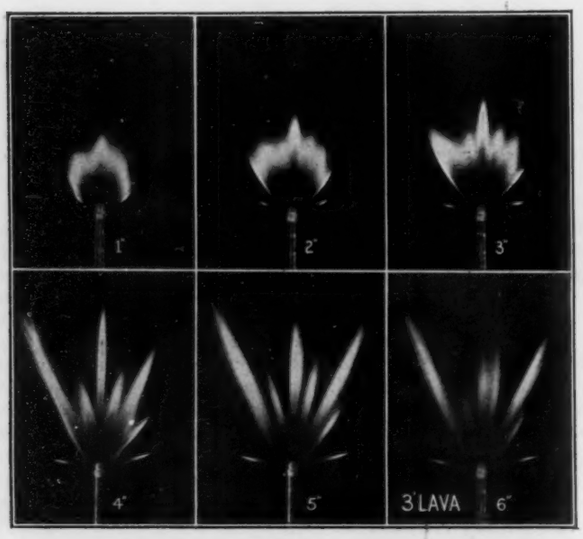


Fig. 1.—Open-flame Burners Tested.



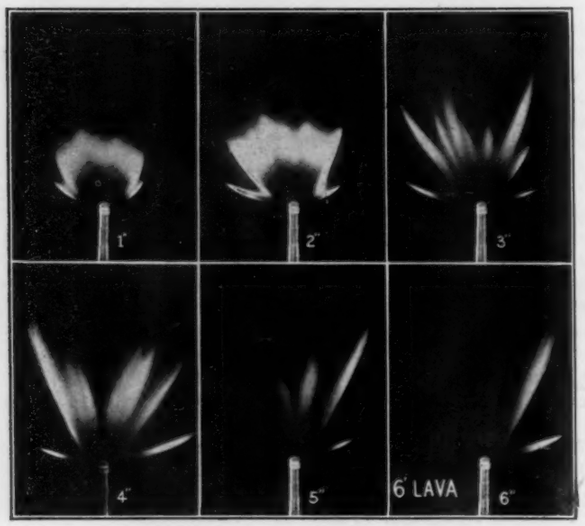
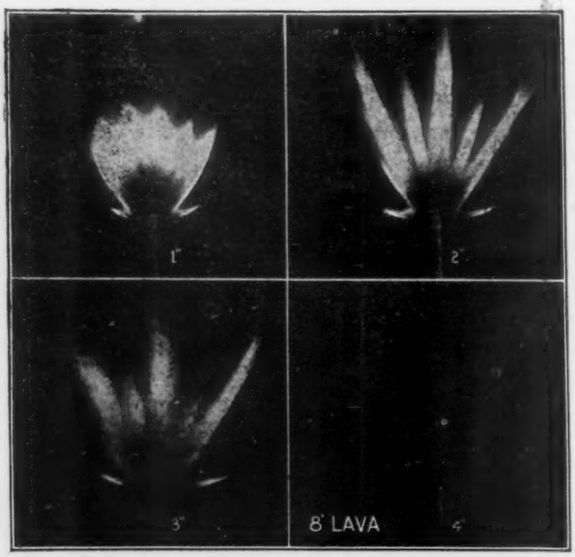


Fig. 2.—Burners A and B, 1 to 6 in. Pressures.



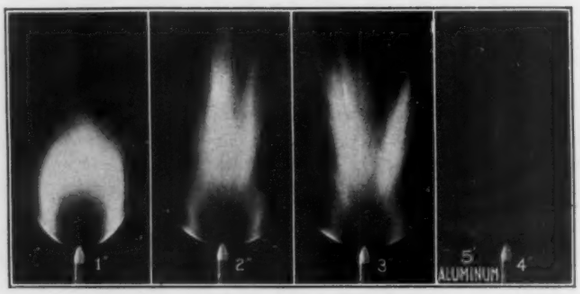


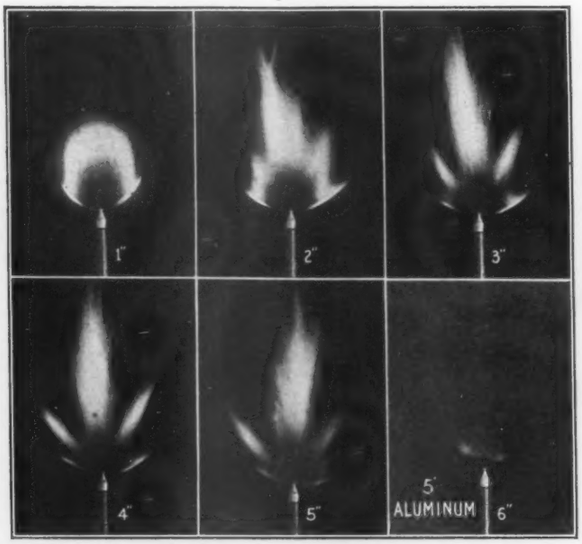
Fig. 3.—Burners C and D, 1 to 4 in. Pressures.

mixture, it was decided, therefore, to use water gas throughout all of the tests. This gas was taken from a special holder of ample capacity for each series of tests. Corrections were made for the barometric and temperature conditions present; and also, in the case of the open flames and where the pentane standard was used, corrections were made for humidity. The gas used was rated at 19.78 candlepower, having a calorific value of 623 B. T. U., and a specific gravity of 0.661. The open-flame burners used (Fig. 1) were photographed at each pressure, and show very clearly (in Figs. 2, 3, 4 and 5) the effect of pressure on the different flames.

In the open-flame tests, readings were taken of the intensity in a horizontal direction, in a plane at right angles to the flat side of the flame, at each pressure from 1 to 8 inches. One burner from each series was then read at 2 inches pressure at each 15° point in the horizontal plane and also in the vertical plane. In the horizontal plane readings, the 0° angle was taken at the edge of the flame, while the 0° angle in the vertical readings was taken below the burner, and the 90° angle at right angles to the flat side of the flame.

It will be noted from the horizontal and vertical distribution curves of the open flames (Fig. 6) that the distribution is almost symmetrical in all directions, that is, the direction of the light rays is similar to that which we would have from a sphere or ball of light, and, therefore, the horizontal candlepower value is practically the same as the mean spherical candlepower. Fig. 7 gives the duty, horizontal candlepower and consumption of the representative burners. It may also be noted that the duty (candlepower per cubic foot) falls off from the 1-inch pressure point with all the burners tested. The highest efficiency does not in any instance exceed 4 candlepower per cubic foot, while the lowest "A" was only about 2 2/3 candlepower per cubic foot.

Many of the open flames here shown would not of course be per-



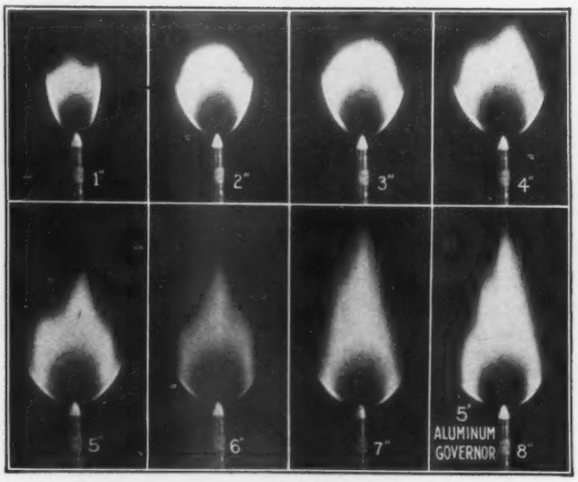


Fig. 4.—Burners D′ and E, 1 to 6 in. and 1 to 8 in. Pressures.

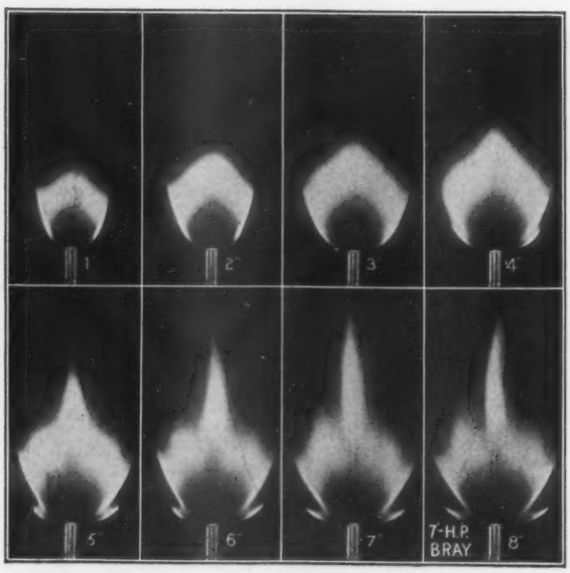


Fig. 5.—Burner E′, 1 to 8 in. Pressures.

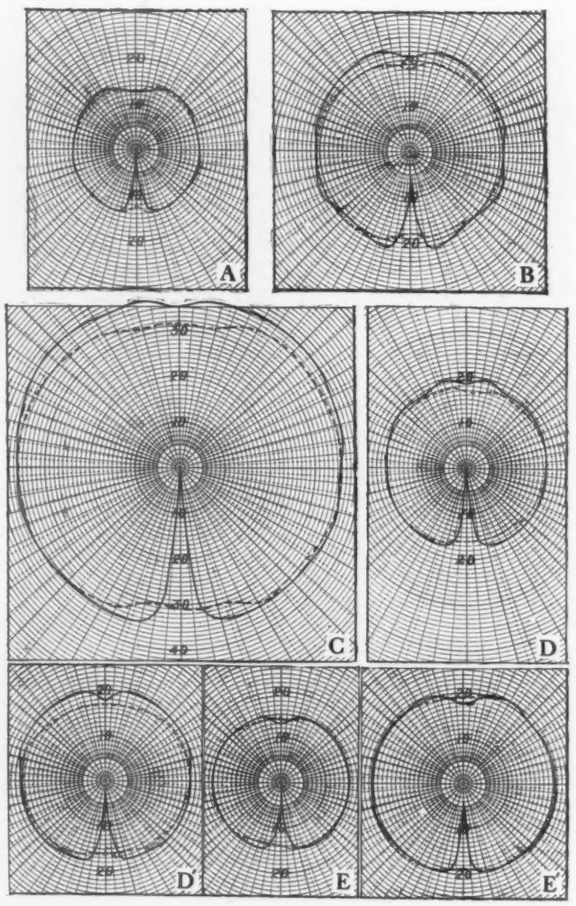


Fig. 6.—Distribution of Light about Open-flame Burners.
——— Vertical Distribution.
- - - - - Horizontal Distribution.

mitted to run in this way by the consumers. It is difficult, however, to determine just what judgment would be used in this matter. The boy who may be responsible for several lights in the basement is paid $2 a week without regard to his knowledge of gas illumination; a roomer in a boarding house may leave the burner on full in the endeavor to get his money's worth; while perhaps the man who pays the gas bill realizes that in another way he may get the most for his contribution to the gas company. Consequently, the key was left on full to the pressures stated, and it is left with each reader of the paper to judge at just which point and at what pressure he would turn it down. The curves will show what the result would be.

TABLE I.

Open-Flame Burners Illustrated in Figs. 1, 2, 3, 4, and 5.

Test.	No. of Burners.	Rated Size in Cubic Feet.	Kind of Burner.
A	1	3	Lava tip.
B	6	6	Lava tip.
C	2	8	Lava tip
D	1	5	Aluminum tip.
D′	4	5	Aluminum tip.
E	1	5	Aluminum governor.
E′	6	7	H. P. Bray special.

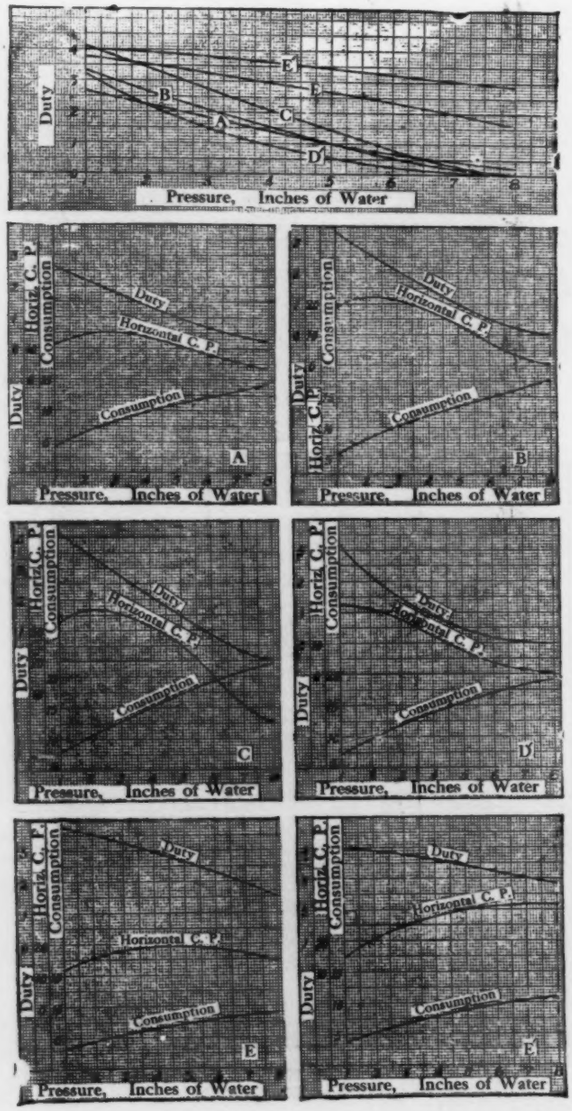


Fig. 7.—Characteristics of Performance of Six Open-flame Burners.

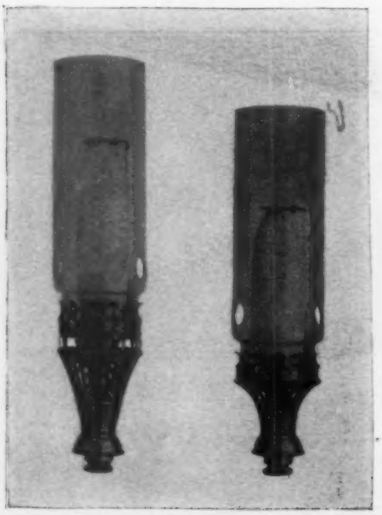


Fig. 8.—Upright Lamps, G and H.

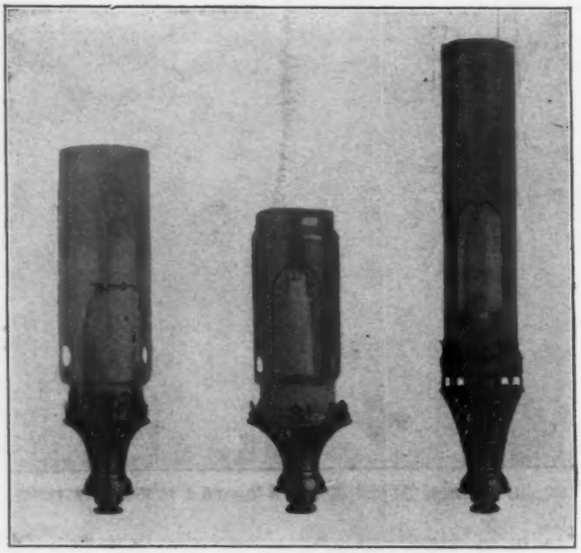


Fig. 9.—Upright Lamps, I, J, and J'.

TABLE II.

Results from Open-Flame Burners at 1-inch and 2-inch Pressures.

	Horizontal Candle Power.		Consumption Cu. Ft. per Hour.		Duty Candle Power per Cu. Ft. per Hour.	
Burner.	1-inch Pressure.	2-inch Pressure.	1-inch Pressure.	2-inch Pressure.	1-inch Pressure.	2-inch Pressure.
A	11.02	14.34	4.14	6.45	2.66	2.22
B	18.44	21.9	5.56	8.2	3.32	2.66
C	31.9	36.0	7.8	10.5	4.1	3.43
D	19.5	17.6	6.0	8.4	3.25	2.1
D'	22.4	21.0	7.0	9.55	3.2	2.2
E	11.38	15.6	3.03	4.45	3.76	3.5
E'	14.26	20.5	3.57	5.24	4.0	3.92

Upright Incandescent Mantle Lamps.

Ten upright lamps of each kind, G, H, I, J and J' (shown in Figs. 8 and 9) were equipped with mantles 4-inch by 1-inch, 3½-inch by 1-inch, 2½-inch by 1-inch, and the smaller mantles, 2½-inch by ¾-inch, on J and J', all of which were cotton. These were taken from regular stock, and were tested at all pressures, 1 to 8 inches. Each lamp was adjusted

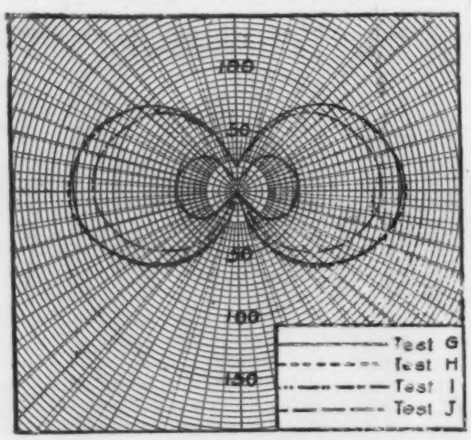


Fig. 10.—Comparative Light Distribution about Upright Mantle Lamps at 2 in. Pressure.

at each pressure for the maximum candlepower, this maximum being judged by the eye without the aid of the photometer. In other words, each lamp was given a "fitter's adjustment." The purpose of the entire test was not to show the highest light output nor maximum efficiency, or duty, which might be possible, but to secure average results which could be readily reproducible and which might represent as nearly as possible the performance which might reasonably be expected in practice with similar equipment under similar conditions.

The comparative light output of these lamps may be noted from the distribution curves (Fig. 10) made at 2-inch pressure. From this it would appear that there is no particular advantage in using a 4-inch mantle at this pressure, as both the duty and light output are greater with the 3½-inch mantle.

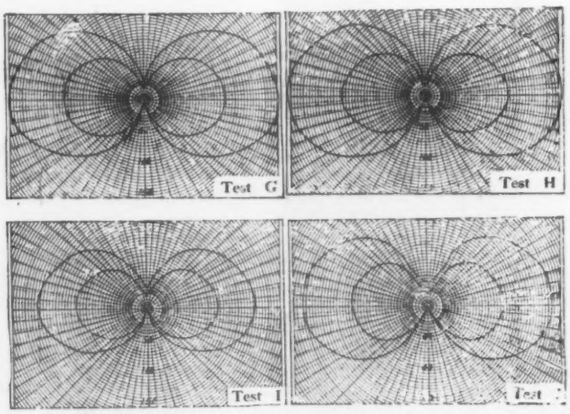


Fig. 11.—Distribution of Light about Upright Lamps at 2 in. and 8 in. Pressures.

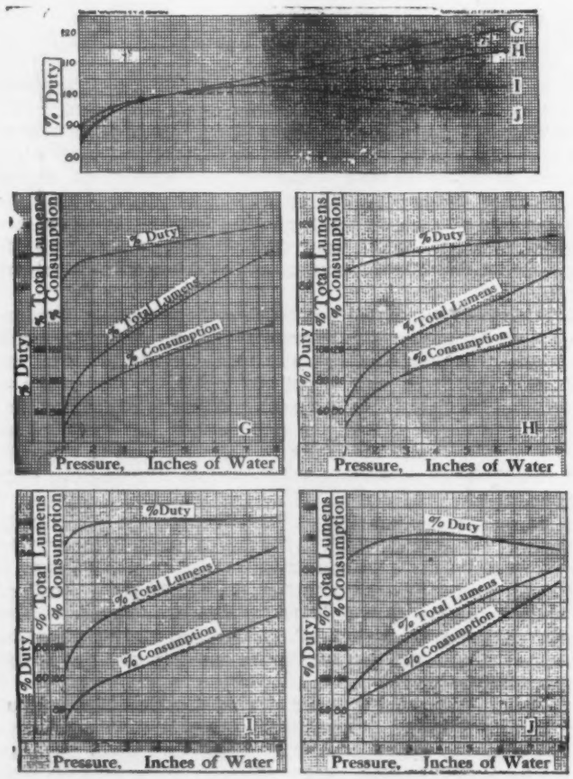


Fig. 12.—Characteristics of Upright Lamps Plotted in per cent with Base at 2.5 in. Pressure.

Such parts of these tests as were more fully reported in a paper given by the writer at the recent convention of the Illuminating Engineering Society will be merely referred to here.

In Fig. 11 is given the vertical distribution curves of the average of each series of lamps at 2-inch and at 8-inch pressures. Fig. 12 shows the characteristics of performance of these lamps at all points investigated. These percentage values indicate that these lamps give considerably higher efficiencies when used on pressures of 2-inch or over.

It may also be noted on reference to the top diagram ("% Duty") that the various lamps acted quite differently under the different pressures. (The horizontal pressure scale values are 4 squares to the inch, with 2½ inches as the base.) Series G shows the highest efficiencies beyond the 3-inch pressures, while at 4-inch the J series dropped off nearly 8 per cent. at 8 inches. Series I follows an almost straight line from 2½ inches to 8 inches.

These results demonstrate that one lamp may meet a certain pressure condition better than another; also that the general assumption of a greater efficiency at increased pressures should not fail to take the burner and equipment into consideration.

A particular lamp, equipped as shown in H (Fig. 8), was tested and then the chimney was changed to one having smaller air-holes. This test proved that the slight change in design—using air holes ⅛ of an inch larger in diameter as in the H tests—increased the light output 14 per cent. In Fig. 13 the curve H′ is with the larger air hole chimney, the inner curve showing the result of the smaller air holes.

The lamp J′ (shown in Fig. 9), was but slightly less efficient than J, having a similar mantle. This lamp did not show as high an efficiency or duty as J, but was shown to have an almost straight line efficiency curve at all pressures from 1 to 8 inches.

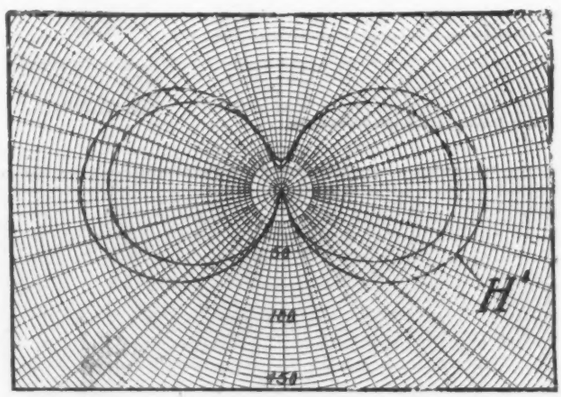


Fig. 13.—Distribution of Light about the same Upright Burner and Mantle equipped with different Chimneys.

Inverted Mantle Lamps.

The tests on the lamps in Fig. 15 were on similar lines to those described above on G, H, I, J, and J′, with the exception that where readings on the horizontal on the open flames and the upright burners maintain a certain fixed relation to the total light from each source, it was found that similar readings on the inverted lamps were not representative, and consequently these lamps were read at each 15° from 0°, below the lamp, to the 180° angle above. The average distribution curves at 2½-inch pressure and the characteristics of performance at all pressures from 1 to 8 inches, are illustrated in Fig. 14. The latter is given with both straight water and straight coal gas. The distribution of light from the inverted lamp with clear cylinder (Fig. 15) at pressures 2 to 8 inches is shown in Fig. 16. These lamps also give so much better results at pressures above 2 inches that the consideration of the supply pressure is most important.

The results of these tests show rather conclusively that reports on the light output and gas consumption of different lamps at different pressures may in no way be considered comparable unless the characteristics of performance of each lamp is known at the various other pressures. To calculate the probable resultant illumination with any gas lamp, it is also necessary not only to have this information, but also that pertaining to the average pressure of supply. With an increase in light production of upward to 100 per cent., depending upon whether the pressure is 1 inch or 8 inches, and depending also upon the equipment used, is surely a point worthy of much consideration.

The calculation of illumination from the distribution curve of a lamp made at a particular pressure would be reproducible only with a service

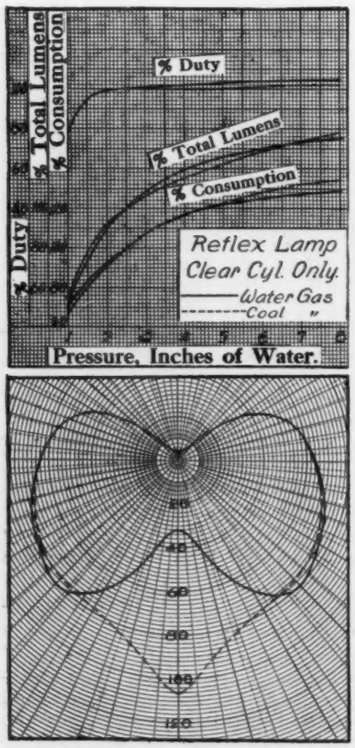


Fig. 14.—Distribution of Light from Inverted Lamp with Clear and Frosted Tip Cylinders, also Characteristics Plotted in per cent with the base at 2.5 in. Pressure.

Fig. 15.—Inverted Lamp, Clear and Frosted Tip Cylinders.

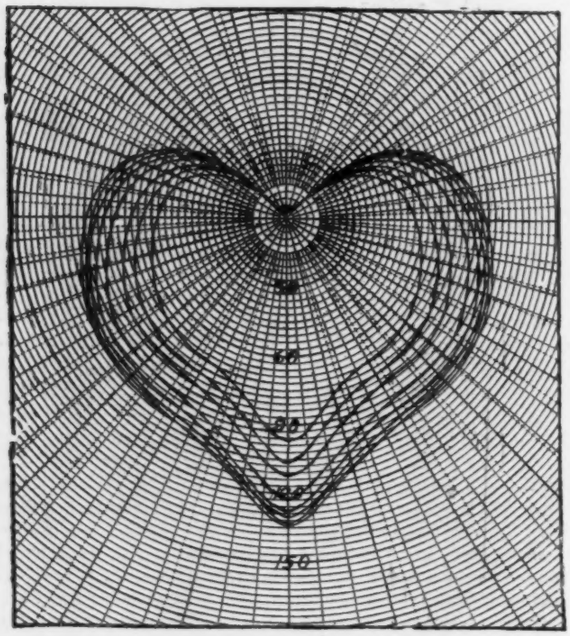


Fig. 16.—Distribution of Light from Inverted Lamps, with Clear Cylinders, at 2 in. to 8 in. Pressures.

pressure similar to that used in the test. Knowing the light output at other pressures, it may readily be determined just what percentage should be added or deducted from the calculated results to bring them into closer agreement with the actual results in the installation due to pressure conditions other than those under which the photometric tests were made.

In Fig. 17 is shown a distributed unit ceiling fixture developed by a combination company for the illumination of the gas side of their show room and offices, and the ventilation of the entire room, utilizing the heat energy from the gas lamps to induce a proper circulation of air and to carry off the vitiated air due to the occupants of the room; the other kind of vitiated air—that from the products of combustion—has never been known to harm either animals or human beings. The detail of construction of this unit is rather evident from the illustration. In the upper right-hand section is shown the galvanized iron duct lining, which is continuous throughout the false ceiling beams, connecting with flues in the walls leading to the roof.

That more attention should be paid to this kind of work is evident from the experiences in many cities. The writer was recently informed that many large factory installations were going to electricity owing to rulings by certain inspectors having that power. These inspectors, in passing upon the ventilation facilities afforded, rated each gas lamp as equal to three persons, with the result that the occupant of the factory was required to install electric exhaust fans. As the sum of the changes for gas illumination and electric ventilation exceeded the costs for electric illumination minus the ventilation, gas had to go.

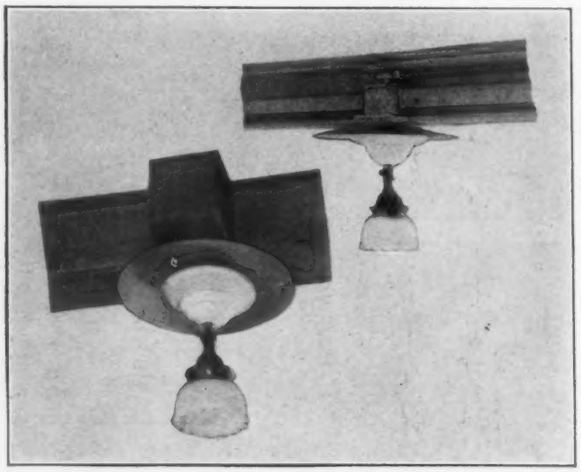


Fig. 17.—Ventilating Distributed Unit Fixture.

A recent experiment with a gas arc consuming 18 cubic feet per hour, installed six inches below the opening of a stack having an area of 1.7 square feet, and but 8 feet long, leading upward into another floor, showed that over 35,000 cubic feet of air per hour were taken through this stack, nearly 2000 cubic feet of air per cubic feet of gas per hour.

Reference might also be made to a gas office in a one-story building, 20 feet by 70 feet, an area of 1400 square feet, having a ceiling 11 feet high, where 56 gas lamps were burned from 4:30 P. M. to 7:30 A. M., just to show where the gas office was located by attracting the attention of those passing in the street. On opening the office at 8 A. M. the CO_2 content was found to be as high as twenty-six parts in 10,000, but after a thorough ventilation via the doors and windows, this was reduced to four parts 9 A. M. As the lamps were all put on again at 4:30 P. M., it was found that the CO_2 content at 5 P. M. reached nine parts in 10,000.

Now the condition which had to be met was how to increase the lamps used from fifty-six to seventy-one, as was desired in making a more attractive showroom, and also take care of the rather serious ventilation conditions present and anticipated. A change was made in the hot-air furnace in the basement, and instead of drawing the cold air from the basement floor, the cold air duct was continued to the outside, then the fresh air, which was also screened in this cold air duct, passed around the furnace and through the three regular registers in the floor of the showroom. Four ordinary ventilators were then installed on the roof, connecting through seven-foot stacks with the ceiling of the showroom. With an increase of nearly 30 per cent. in the number of lamps used, the ventilation results were as follows: At 8 A. M. with seventy-one lamps on from 4:30 P. M. the day before, the CO_2 content was less than eight parts in 10,000; this was reduced to three parts by 9 A. M.: and at 5 P. M., the close of the business day, it had raised to only five parts in 10,000, and this with the doors and windows closed.

The cubical contents of the room was 16,500 cubic feet, and on windy days the ventilators passed over 20,000 cubic feet of air per hour; and on days when the wind was slight or absent, over 60,000 cubic feet of air per hour, resulting in a change of air in this room from one and one-quarter to three and one-half times per hour.

In concluding, Mr. Macbeth followed the text with these showings: Another point is this. A gas man has to look after every piece of business that he can get hold of. Here is an installation used in a window for deck lighting, where inverted lamps are placed above this deck, which window I understand has been the means of winning that entire installation of tungsten to gas arcs in the interior. They are not gas arcs in the window. Gas arcs I believe were tried out, tested and displaced, electrics going in. In the meantime this window installation was put in, and by hammering at that and showing how good it had been in the years it had been installed the electric has been cut off. The detail of a window of that kind can be arranged in this way: Just simply a deck, using a ripple glass, which may be purchased almost anywhere. Ripple glass gives you all the advantages of a frosted glass in hiding the store, with none of the disadvantages of high absorption. The sand blast glass will absorb about 20 per cent. of the light, where the ripple glass absorbs only 5 or 6. Here is a window of similar character, lighted from a deck. It is a gas company window, which was installed in Knoxville, Tenn., to show customers there, that window lighting could be satisfactorily carried on with gas and that colors were shown better than with the other kind of window, to which they had been accustomed. The method of lighting, taking care of these windows, may be either with an independent pilot system, as shown *here*, or with the jump-spark system, as shown *here*. There is no difficulty in taking care of that part. This shows another deck arrangement, with a deck somewhat similar to a trough. There is a metal side coming down *here*, so that from the street the lamp is hidden and your light is directed down into the window. In windows of this kind, if they are opened from the outside *here*, holes are bored through *here* so that the outside air can get into the window. There are openings along the top, permitting a circulation of air through the window, which is bound to occur if you have any heat from the lamps, thus keeping this glass at such a temperature that it is not possible to have any frost on it in the winter time. I might say that in cities where these windows have been installed in the cold weather the gas windows are the only clear windows. I don't want you to infer from that that there is anything from the electric lamps that causes the freezing of the windows, but people are careless with them, the back windows are left partly open, and the interior of the window reaches about the temperature of the interior of the store, with the result that, whatever moisture is in the air, and there is considerable, is condensed and freezes on this glass from the cold air on the outside. Here is shown a similar proposition, using an angle shade. In a deep window, where it is desired to get the light back into the window, or if you have a semi-deep window, you can alternate cone shades and the straight angle shades. This shows one of those windows fitted up. It is rather peculiar in a way that you should have this opportunity of noting that this kind of installation is insect-proof as well as having other advantages. These are those frames which you note in *here*. That picture was taken from the sidewalk in the winter. Another point I want to touch on. If you want light windows light them properly, light them from the inside; don't sell arc lamps for the outside to light windows. You can sell your arc lamps for the outside for the purpose for which those arc lamps are best adapted; that is, for lighting the outside and lighting up the sidewalk. It is necessary. *Here* is a well known installation, where the lamps were put out for a purpose. The windows had been attended to long before this installation was taken up, and we just continued to do the work. *Here* is another store, a similar proposition, from the curb, showing the lamps *here*, with the windows properly lighted. This installation is exceedingly brilliant and very satisfactory. On the next slide I will show you that the windows are taken care of independently. *Here* is the method of window lighting all along in *here*. There is considerable doubt on that. There is a difference of opinion as to whether a window is better lighted from the inside or from the outside, and we wanted to see goods in windows under the most favorable light. The shadows should be satisfactory; they should be nil. *Here* is a window where the lamp distance is so great and the space is so large that the intensity of the illumination is cut down a great deal, but you can see the natural shadows here are just such as you would get on these goods if you put them out with the sun shining on them. On the next slide I will show you all the light and all the shadows reversed. The part of this slide that was dark before is now light, the part that was light is now dark. The outside of the building, which was dark, is now all light, and the inside, which was light, is all dark. That is not faked up; it is simply that one is the positive and the other the negative of the same photograph. *Here* is an installation that I examined just to get that kind of information. *Here* is a lamp installed outside of a double window of this kind, the lamp being installed in the doorway. A single lamp was afterwards put well toward the front of the window, *here*. The window is about 6 feet long, and taking the illumination measurements at *this* point, and *here*, you note that, with a person standing on the sidewalk the eye is about *this* height, and that consequently measuring in that plane it would be a fair determination of the amount of light reflected to the eye by these various surfaces. It was found that from the lamp on the outside only *this* quantity of illumination was effective; with a single lamp inside running 3½ feet an hour *that* amount was effective. In other words, a single lamp in a window of that size does twice as much on the inside of the window as an arc lamp, and when they are both on you get this effect *here*. I can show you that photographically with this next slide. *Here* is the window with the two lamps going on the inside. You can see the detail. You can see the amount of light in *here*. This window is unfortunate, inasmuch as there was a mirror back and it mussed up the photograph pretty well. I must say that, to have these photographs taken to give you a true idea of what it was, it was necessary to arrange with the public service corporation that supplied the electricity in this town, and also with the Board of Aldermen or inspector, to have a certain street lamp cut off, so there was no street lighting on the street when this series of photographs was taken. On this photograph you can see the sidewalk was built up considerably. Now you can see how dark your window is; that is, with the outside lamp alone, and the inside lamp cut off. This next photograph shows the outside lamps off and the inside lamps on. I think you will agree with me; however, at least you will not assume that I did not want you to put lamps outside, but if you do you should take care of the window lighting separately and intelligently. *Here* are a couple of slides that I thought might be of interest to you and so I put them in, *This* is a combination gas and electric fixture, typical of the fixture being installed in the offices in the Peoples Gas Light and Coke Company's building in Chicago, where gas is placed throughout all the offices in the building. The electric lamps are not shown here, but they are attached at *this* point to upright burners and used *here*, and the light is directed towards the ceiling and from there reflected into the lower part of the room. *This* is one of the high pressure lamps used in the main room downstairs. These large columns are single mantle, inverted, high pressure lamps, which they rate nominally at 1,000-candle power apiece. I might say further that this fixture is of bronze and it weighs approximately 1,000 pounds and I believe is worth $1,000. You can remember that association. *Here* is one other piece of work which means a good deal to gas men, and which can be taken up with very little extra work; that is, this outside bulletin board work. *Here* is a bulletin board on the same side of the building that is lighted with electric lamps. The same exposure and everything were given.

Discussion.

Mr. E. L. Elliott said his discussion of the Macbeth paper would be rather in the nature of adding emphasis to the general argument, possibly also adding a certain amount of criticism affecting the attitude of the gas companies towards the question of illumination. In offering what may seem an arraignment of the gas interests for what appears to me a failure to embrace unusual opportunities for the advancement of their interests, he did not wish it to be understood that he failed to appreciate in the least the most excellent progress made by the gas interests in general, and by the National Commercial Gas Association in particular, in bringing gas illumination up to the standard which it once held in this country, and which it still holds throughout Europe. Commendation has a satisfaction, but it is not always as directly helpful or stimulating as sincere and thoughtful criticism. The general attitude of the gas interests toward gas illumination struck him as being one of timidity, they seeming to be afraid of their own proposition. Their competitors had argued so long and effectively that the gas men themselves had come to believe they had only a second-rate proposition, that gas illumination had been outclassed, through being unavoidably limited in application. The most curious thing about it was that the principal arguments raised against gas light had no adequate foundation in fact. It reminded him of the old topic of discussion that he heard in his boyhood as to why it was that if one put a live fish into a bucket of water the weight of the bucket and its contents would not be increased? Many a heated argument took place over that apparent scientific paradox. The final solution of the problem, by actually carrying out the experiment and noting the results, showed that the statement was not true. There

were several arguments against gas light that would turn out in like way when subjected to the same rigid test. To these Mr. Macbeth had called attention and had given the answer, but he might repeat them in brief. There was the "vitiation of the air" argument, which sounded so very plausible that it had even been made the basis of legislation; yet the most competent scientists, among whom Prof. Lawes, of London, might be particularly mentioned, had repeatedly shown there was positively nothing in the claim. The great amount of heat produced was another standing argument which the gas interests had never had the courage to combat, at least until Mr. Macbeth began to run down the subject in his usual thorough and convincing manner. The green color of the mantle gas lamp was another claim made by our competitors and still generally believed by the public. Like the argument on the fish, the simple answer to this was, "It isn't so." As he had always maintained and repeated time and again in print, in quality of illumination—which word quality included by all odds the most important element in illuminating engineering—gas light, as produced by the modern incandescent or mantle lamp, had no superior among modern illuminants, and it was distinctly superior unless intelligent precaution in the use of other sources were taken. On the artistic or decorative side the gas interests had likewise allowed their case to go by default. So long had they been contented to sell their product on the question of price alone that their competing interests in the production of light and the makers of fixtures left them well-nigh stranded with reference to this important phase of lighting. There was a general impression among householders to-day that it was impossible to obtain really artistic or modern fixtures adapted to the use of gas. The number of houses without gas piping was undoubtedly increasing at a rapid rate, and all other causes put together would perhaps no more than balance this one reason; namely, the belief of both architect and owner that first-class fixtures and lighting effects cannot be obtained with gas. He would call their attention to the motto and device which was before them on the front of the speaker's desk, "Be just and fear not." The uplifted hammer indicated, not that we must "knock" our competitors, but that, having truth and fact upon our side, we should have the courage to strike vigorously for our own cause. There was no occasion for fear or side-stepping; but there was every reason why we should hammer away with a clear conscience and goodwill until we have convinced every logical user of gas that gas illumination to-day is as up-to-date and meritorious as any other means of artificial illumination which science had devised. To accomplish this would require a determined and well organized campaign of public education. When we had simmered the whole thing down to a final analysis, commercialism, in the sense in which it pertains to this Association, was simply a question of public education. For whatever purpose gas may be used, or whether it was securing a new customer or inducing an old one to make greater use of our product, it would come to a matter of educating him until he saw the subject from our viewpoint. He believed this Association has been a powerful factor in this great work of public education, but he also believed that its work in this direction had hardly yet begun. From all the evidences of interest and enthusiasm which he had seen displayed, among which the magnificent educational exhibit of gas illumination in connection with the Show was particularly impressive, he was convinced that the day of better methods and greater general appreciation of the possibilities of gas lighting had already dawned, and that the immediate future will show results which will satisfy the most optimistic.

The President called attention to the fact that time was going rapidly, and that, as Mr. Macbeth had covered his subject so thoroughly, unless somebody had an important question to ask, he thought they should dispense with further discussion at the time, always bearing in mind, however, that discussion may be presented to the Secretary, who will see it appears in the Proceedings.

Votes of Thanks.

Mr. Clabaugh—Mr. Chairman and Gentlemen: It has always been customary before adjournment to review in a very short way the work done by the officers of this Association. We, as the privates in the ranks—some of us, at least—have no idea of the magnitude of their work. A year ago, when we adjourned in New York, having elected our new President, we did not know altogether of the good work that had been done by this Association in his election; but for the past year our worthy President has shown by his innate executive ability what could be accomplished by this Association, and he has been on the bridge of this ship with his pennant flying for the whole year. It has never yet been pulled down, and I trust that that pennant may stay there indefinitely. This ship started out from New York with a membership of about 1,000. It has sailed in turbulent waters, but with our President on the bridge, and his worthy Secretary at the helm, it has been guided safely through these waters until we reached a safe and beautiful harbor in Boston. During the year this Association has accomplished so much that it would take volumes to tell you of it all, but by the executive ability shown he has appointed members to take up part of his work. In every city, almost, the greatest amount of energy has been exhausted by Mr. C. W. Hare, who has formed companies and sections of this Association, that have met this ship as it stopped in the different harbors, the members to be taken on and to do their work and act as the crew. And, through his wonderful energy and exertion, Mr. P. S. Young, who has, to my mind, been at his work from early morning till late at night, for I think that I could have filled a case with correspondence that he sent to our own company, has helped to increase this membership, which to-day is over 2,150. As was told you a few evenings ago, it is the largest Association in this United States or in the world of its kind. Now, gentlemen, there are other men who have done wonderful work. Mr. W. J. Clark has been on this ship, sending out each and every month a "Bulletin" of the working of this Association. He has asked each and every one to contribute to that paper, and if there are any here who have had any criticisms to make in the past year it is up to them in the coming year to come forward and accept his invitation to contribute to this paper, to make it what they believe that it should be and what we hope that it always will be. This ship has at last landed in the port of Boston, and even nature has added its mite, and, knowing the purity of this Association and what it believes, has spread a mantle of white all over this beautiful city, in order that any imperfections might be hidden from these men of pure eyes. And, gentlemen, we have been met here by this Reception Committee and have been entertained most magnificently. Everyone of you enjoyed that delightful ride yesterday all over this city and the surrounding suburbs, to the Naval Academy and all other places of interest; and to the Entertainment Committee we must offer our sincere thanks—to Mr. W. B. Nichols, who, as Chairman, has done everything to help us enjoy our stay. Mr. Cortis came to the front at a critical time with the solution of a labor problem in putting his pipes and fixtures for gas distribution in the hall. All of us who have had any labor troubles of any kind whatsoever know what that problem was; but, like Mr. McLean, in New York last year, it shows that we have men who rise above all questions of that kind, and to-day we can see, by what has been done here in the lighting of this exhibition hall, how well he has done his work. Mr. Farrow, who has been handling the exhibits, deserves mention, for to him we owe the beautiful exhibits as they are shown now. To Mr. Roberts, who has laid out this floor space—no easy matter, gentlemen; it required care and attention—and to Mr. Ernest Barker and his assistant, Mr. Drey, for inspecting and policing, we owe our thanks. There has been no trouble, there will be no trouble, when Mr. Barker is at the head. And to the authors of all these papers we are greatly indebted; for, gentlemen, we have heard some magnificent papers here, and I feel assured that we will go away to-day knowing that we can carry back to our homes something of interest and something to help us push along the good work that we have undertaken. In sitting here I was struck by this little motto, "Be just and fear not," above the strong arm of the mechanic. I think that that is a good motto for this Association; for we have preached honesty and integrity, truthfulness and justice. Gentlemen, no society, no business can ever succeed without having the foundation of truthfulness as its motto, and upon that can be builded everything that we everywhere aspire to. But I would add to this the other line (I think it is in Shakespeare), "Be just and fear not. Corruption wins not more than honesty." Let us keep this before us, for this is a fraternal organization—man-to-man, brother-to-brother—and cling together, reaping the harvest, trying that we aim, not so that when the wheat is cut it will be 20 per cent. of efficiency from the grain that produced it, but that it may be 100 per cent. in our honesty, in our justice of purpose and in our work for our respective companies; so that, when we meet a year hence, we can all say that we have done our best, and that no man can improve upon. Pardon me, just one moment. One gentleman whom I have omitted is Mr. Ware, Chairman of the Exhibition Committee. To him we all know what we owe. Gentlemen, if there are any men who have helped to make this meeting what it has been, the greatest of the many meetings that we have already had, to them I give great honor. As I meant to say before closing, I will ask an expression from this

Association by a rising vote, to approve what I have said of the officers of the Association.

The President—Those in favor will please rise. [All arose.] It appears a unanimous vote. Before closing this convention, gentlemen, I desire to express my personal appreciation of the assistance given me, not only by the men mentioned by Mr. Clabaugh, but by every man who has contributed toward the success of this Association. I want to thank personally the members of the local committees, who have done such valiant work in bringing this convention and exhibition to a successful issue. I want to thank the manufacturers, who have given freely of their time and money and effort in producing a successful exhibit. And I want to thank them especially for the spirit of co-operation with which they have overlooked any of the shortcomings of the management. I want to thank the authors of the papers and those who have taken part in the discussions, and I want to thank the members who have been assembled here for their courteous attention to the papers. Some will say that the value of such meetings as this lies in the papers and discussions. Our subjects have covered a wide range, the discussions have been spirited and, I am glad to say, widely representative. Others will say that the value of the meeting comes in talking with other men from various parts of the country and exchanging ideas and experiences. Still others will insist that it is the exhibition, which shows us the multitude of ways in which gas may be used, of the most value to us. But, I say, gentlemen, that it is all these things and one thing more. To me, and I think to all of us, what we get of most value out of these meetings is enthusiasm. That, gentlemen, is the secret of all successful effort. We come to these meetings, we see the exhibits, we hear the papers, we talk with other men, and get thoroughly imbued with the spirit of enthusiasm. We go back to our companies with a renewed confidence and determination to give our best endeavor to the service of the companies which we represent. The future of this Association, gentlemen, is assured in the hands of the new Board of Officers and Directors, and especially in the person of Mr. C. N. Stannard, your new President. I willingly relinquish this office, which it has given me such pleasure to hold during the past year, with the secure knowledge that, 12 months from now, when we meet again in Denver, we shall look back upon the work of this year as the mere beginnings of a movement which will make this Association not only the biggest but the best in the world. [Applause.] Is there any other business to come before the meeting? There is an announcement which I neglected to make. If any of the gentlemen happen to be interested in street lighting, or in the automatic lighting and extinguishing of street lamps, we have an example not far from this building of a number of lamps which are lighted in that way, and we shall be very glad if anybody cares to see these lamps to have him do so. They light up about 4:15 this afternoon by automatic pressure from the works. They are right around the corner from this building, on West Newton street and other adjoining streets. If these is no further business, gentlemen, a motion to adjourn is in order. [Declared adjourned.]

The Reorganization.

Immediately after the adjournment the Association was again called to order by Mr. Wrightington, who said: It is necessary, gentlemen, in connection with our incorporation and other matters, that we shall hold immediately a meeting of the new Association, the Association beginning from this moment at the adjournment of the other Association.

Mr. McLean—I move that Mr. Stannard be temporary Chairman and Mr. Stotz temporary Secretary of this meeting. [Seconded and adopted.] I move that the officers of this Association for the ensuing year be the officers of the National Commercial Gas Association as recently elected, and that the Secretary be instructed to cast one ballot for the election of C. N. Stannard, for President; L. S. Bigelow, Glenn R. Chamberlain and R. C. Frampton, for Vice-Presidents; and P. S. Young, for Treasurer. [Seconded and adopted.]

The Secretary announced he had duly cast the unanimous ballot for the election of the officers as named by Mr. McLean.

The President asked for further business.

Mr. McLean moved that the by-laws of the Association be the same as the by-laws of the National Commercial Gas Association, as adopted December 6, 1910. [Seconded and adopted.]

On motion, the convention was declared adjourn ed.

The gas machine making concern known as the Western Gas Company, with headquarters, in Illinois, has gone defunct. All its possessions were sold at auction in Chicago the other day, the purchaser being John H. Lally, who acted for George H. Hanley, the mortgagor.

[Continued from page 604.]

THIRD ANNUAL MEETING, INDIANA GAS ASSOCIATION.

Held in Fort Wayne, Ind., January 18th and 19th, 1911.

Second Day—Morning Session.

The President—Gentlemen, I did intend to extend a welcome to the members of the Electro-Technique Club and to the architects and engineers of this city; but I do not see them here. However, I am very glad to see that our members have responded so nicely. We will now have the address by Mr. Norman Macbeth, on

GAS ILLUMINATION.

The particular points which I wish to take up at this time have to do with the use of gas for illumination in residences. The enormous amount of advertising by our electrical friends, and the lack of advertising by the gas men, have resulted in the architects, and in some cases the builders, omitting gas piping from new buildings. Several reasons may be given for this, but I think that in the greater number of cases it is a matter of ignorance of the results possible and of the value of gas for this purpose.

I was interested in looking over some Journals lately to come across an editorial in the *Electrical World*, of August, 1907, to the effect that there was not a single course in illumination given to students of architecture anywhere in the world. That article was contradicted in a later issue of the *World* by a Professor of electrical engineering in the University of Illinois, directing attention to their catalogue in which a short course for all students in architecture and architectural engineering was mentioned. This course was almost entirely electrical, and the fact was noted that "The students are urged to introduce raceways for wires in any building they may design." If this was the extent of the instruction given to architectural students, prior to 1907, by one university in this country, we can hardly blame the architects for lack of information or knowledge on this question.

I also believe that represents just about the status of affairs to-day, and the extent to which the architect takes up the problems of illumination presented in the homes he designs. We can hardly blame him for this, as he has a large amount of detail to look after; and, furthermore, in view of the enormous quantity of advertising from the electric side, with the gas men sitting tight and selling gas on a quantity or cubic foot basis, and paying at best very little attention to illumination.

That is why gas illumination has gone down, or has not come up, as you choose to look at it. This is especially true in those States where considerable natural gas has been used. The natural gas was sold at so low a rate that the companies were only concerned in large quantities, and as the amount of gas required for the illumination of an ordinary house was so ridiculously small it wasn't worthy of attention. The entire lamp and mantle question was left to the dealer, and I think there is no doubt that dealers throughout the natural gas sections handled the cheapest burners on which they could get their hands, and consumers in these States don't know to-day that satisfactory gas illumination is available. They go to the electric sources which have been so fully advertised, and must either put up with higher costs or less illumination.

To-day the gas man has to start at the beginning, when he ought to be pretty well under way. Architects are making a serious mistake in omitting piping from the average residence, as many builders who are in close touch with the demand are to-day omitting wiring, where a few years ago they were putting in both wiring and piping.

In Germany, where I believe the original settler to Missouri came from (the man who has to be shown), 1½ per cent. only of the houses are wired. They have in Berlin about 2½ per cent. of the dwellings and business buildings wired. What are the other people using? We have other reports from Germany that 98 per cent. of the gas outlets are equipped with mantle burners.

I was interested in looking up conditions in Philadelphia, to get figures from the city department as to the number of buildings and dwellings in the city, from the gas company as to the number of gas meters, and from the electric company as to the number of residences wired.

Out of 335,000 dwellings the electric company claims 10,000 wired. That should not mean more than 10,000, but 10,000 as a round figure probably actually less or at least below 10,000. Therefore, this is 3 per cent. of the dwellings in Philadelphia that are wired, which does

not necessarily mean consumers, but merely houses wired. The gas company has all the rest, with the exception of about 5,000 buildings not metered, many of which may not be used as homes, so that they have about 98 per cent. connected. Those figures tell pretty well how the situation is. This is in spite of the fact that electric companies and contractors have been granting concessions for the wiring of old houses at low rates. In view of such figures are architects and builders justified in forcing the occupants of their houses to still further contribute to the cost of high living by the omission of gas piping from this class of buildings?

Many of the electric men present have a fair idea of the rather severe competition from the gas end of the lighting business to-day. I would like for a moment to analyze this competition and possibly forecast what I believe is coming. Do you realize that this competition is from the consumer, most frequently depending upon his rather scant knowledge of the subject? Now, if you call this competition to-day, what are you going to name it when the gas companies have reached the point that they are approaching rapidly where they will take up this work aggressively and co-operate with the consumer, looking after the installations when they are put in and seeing that the right kind of lamp is used and maintenance given? I feel, as I have frequently said, that the gas companies have not been doing what they should in the way of pushing this business, but a new movement in this direction is now well underway and is growing rapidly. We have got the ball rolling, and in the matter of a few years the results will astound every man who is to-day in the business or has a knowledge of present-day conditions.

Much of the literature in reference to gas lighting, and especially that circulated by our competitors, has referred to open gas flames. When the tungsten lamps came out, it was said that you could have electric light cheaper than gas. This was on the basis of open flames, which qualification, however, was rarely given. In the points I am going to take up this morning, I will only refer to modern gas lighting from the standpoint of incandescent mantle burners, as covered by the original patents of Dr. Carl Auer von Welsbach.

The incandescent gas lamp yields a greater quantity of light per unit of cost than any commercial source available for residence or home use. We hear a good deal about the matter of convenience. Now, gentlemen, you know that switch control is not "wished" into a building, but is placed there at considerable expense. Switch control does not grow on the same tree with electric lamps, and when you buy an electric lamp you do not get a switch control with it nor any greater convenience than goes with a gas lamp. Switch control has to be put into the building. You know how difficult it is to arrange the control for a lamp in a particular part of the house from three different points; it is fairly easy from two; it is simple from one. With a magnet valve and ordinary bell wiring we have no more difficulty in arranging for switches from 6 different points than you would have to install 6 push buttons in various parts of the house to ring a bell in the kitchen. We can arrange control from all over the house; can have a switch convenient to every lamp you have in the house, and have others in the various hallways; and, in addition, a series of buttons in one room which will turn on or off the gas from every lamp in the house—light any or all and extinguish them as you choose.

There is another point in residence work that is especially worthy of consideration. We have decorative possibilities that are not possible with electric lamps without considerably greater losses. This is especially so with the inverted lamps. Consider an incandescent electric lamp. The distribution of light from this lamp is practically uniform or equal in the upper and lower hemispheres—50 per cent. in the upper and 50 per cent. in the lower. To get a higher efficiency in the lower hemisphere you use a holophane reflector; you can secure slightly higher efficiency by using an opaque reflector. When you use a holophane reflector you change the distribution of light proportion to 30 per cent. in the upper hemisphere and 70 per cent. in the lower. The natural distribution of light from an inverted lamp without a shade or reflector is 30 per cent. and 70 per cent. We can put a handsomely colored shade on a gas lamp and have the same distribution which you must use a holophane reflector to secure, while in addition we can meet the color and design effects so desirable and necessary for residence installations.

On this question of heat from gas lamps. We cannot deny that we have heat from the combustion of gas, otherwise how could gas companies sell gas ranges and water heaters. As a matter of fact, light from any source is produced with a large excess of heat energy. There are not any of the commercial lamps, not even the tungsten, from which the radiant heat is not about 95 per cent. of the total energy. With the gas lamps the heat is proportional to the gas consumed. The combustion of a cubic foot of gas in a burner used for illumination produces a definite amount of heat, depending within narrow limits upon the composition of the gas. Of course, as we increase the efficiency of our lamps we reduce the consumption, and in direct proportion as we reduce the consumption we have reduced the amount of heat developed.

I am not going to take up the question of how much of the heat from a gas lamp is radiant nor how much is convected. Tests have shown, however, that with lamps of practically equal candle power, and producing equal illumination effects, the radiant heat in that zone below an electric lamp is greater than with a gas lamp. Setting that question aside, however, and considering only the total amount of heat from a lamp, we have but to consider in the case of a gas lamp its consumption in cubic feet of gas per hour, and the calorific value of the gas, which may vary in different localities, but which we may assume at an average value of 600 B.T.U., while with the electric lamps the calculation may be determined by the wattage of the lamps at their calorific value of 3,413 B.T.U. per kilowatt hour. To help out the illustration, we may consider ordinary hard coal, with a heating value of about 14,000 B.T.U. per pound, or 875 B.T.U. per ounce. With these figures as a basis, we will find that our gas lamps liberate not over two, and less than three times the heat from a carbon filament electric lamp giving equal illumination; that a gas lamp consuming 3.3 cubic feet per hour will liberate 2,0 0 B.T.U. per hour, which is equivalent to a piece of hard coal having a weight of 3.2 ounces, a cube of coal approximately 1½ inches square, if the combustion of this coal was prolonged over one hour.

Neither builders nor architects would consider a heating system as having claims to efficiency where a small cube of coal was suspended 6 or 7 feet above the floor, allowing 1 cube per 100 square feet of floor area. Now, this is really the heating effect we secure with gas lamps, and I know of no better way of satisfying yourself than by placing a number of thermometers in a room occupied as under everyday conditions and using gas lamps for illumination.

There is another consideration which would logically come in at this point—the vitiation of air by gas burners. I believe I can cover this question more clearly by quoting from a paper given some time ago by Professor M. C. Whitaker: "It is an unfortunate thing that the impression should prevail that the vitiation of air by gas lamps is founded on sound chemical facts, in view of the fact that it has been proven without a doubt that no unhygienic conditions attend the use of incandescent gas lamps. From a chemical standpoint, the relations existing between the combustion in a gas lamp and the respiration in animal life are very similar. As we all know, animal respiration takes the oxygen of the air into the lungs and, after it has gone through a chemical change, discharges it in the form of carbon dioxide. In addition to the carbon dioxide exhaled from the lungs there is a considerable quantity of water vapor.

"Similarly, it is well understood that combustion in a gas burner requires the oxygen of the air, part of which is combined with the carbon of the gas and discharged in the form of carbon dioxide; the other part combines with the hydrogen of the gas and is discharged in the form of water vapor. To this extent the same products are discharged both from the lungs in animal respiration and from the combustion in a gas lamp. The distinct difference exists, however, that in animal respiration the discharge products must of necessity carry with them the organic constituents and bacterial contaminations and odors incident to the body, while the products discharged from the combustion of a gas flame must of necessity be, on account of the high temperature condition, absolutely free from organic matter and thoroughly sterile.

"As the last resort, it has been stated that the carbon dioxide produced by the combustion in the gas burner is a 'poisonous gas.' Let us analyze this statement. Carbon dioxide occurs as a natural constituent of the atmosphere we breathe to the extent of three parts in every 10,000.

"It is estimated by Faraday that the animal life on the surface of the globe consumes 3,500,000 tons of oxygen per day and converts this into carbon dioxide; but, notwithstanding this, chemists find that the percentage of oxygen in the atmosphere does not decrease, nor the percentage of carbon dioxide increase in the slightest degree.

"It is well understood that this equilibrium is maintained by plant life, which absorbs carbon dioxide and exhales oxygen. This oxygen in turn is consumed by animal life and by combustion, and is returned by these agencies to the air in the form of carbon dioxide. In

this way the cycle is complete and continuous, and the much maligned carbon dioxide takes its place as a substance vitally essential to plant life, and indirectly essential to animal life, instead of being a poison."

A cubic foot of gas burned in a modern burner will develop about .8 of a cubic foot of carbon dioxide. On this basis a small, upright burner, consuming 2 cubic feet of gas per hour, will produce about 1.6 cubic feet of carbon dioxide per hour and an inverted burner will produce about 2.4 cubic feet per hour. In other words, this lamp will consume about as much oxygen and evolve about as much carbon diovide as a man engaged in the moderate exercise of walking the floor.

The most important consideration in the contamination of the air in a room, therefore, depends upon the number of people in that room, and in our homes the rooms are rarely likely to be crowded. Now, while this is the most serious consideration, I doubt whether any of us have gone so deeply into this matter that we have determined the capacity of our rooms and the number of persons who may be present without bringing about conditions which would be decidedly unhealthful. Imagine an anniversary or birthday celebration at your home with just that number of friends attending who could be accommodated within your limit of "vitiation of air capacity"—the festivities are underway when the information is brought to you that your best friend, Bill Jones, whom you did not expect, has succeeded in getting back to town in time to join your party, and you are compelled, because of hygienic considerations, to tell "Bill" that your rooms are now full and that if he should come in the addition would be sufficient to render the air unhygienic.

Possibly the most exhaustive, complete and scientific series of tests ever made were those reported by Dr. Samuel Rideal, in the "Journal of the Royal Sanitary Institute," March, 1908. In two adjoining rooms of equal size, and otherwise similar, gas and electric lamps were installed of a size to produce approximately the same illuminative effects. Gas was used for illumination in one room and electricity in the other, alternating each night.

These tests were continued for over 3 months, with 15 men under observation on more than 50 occasions, and in all, some 6,000 tests were made. The tests were of the kind best calculated to determine any falling off in conditions as might be expected to take place under either mode of illumination. The conclusions are somewhat startling to those who have never given this matter more than a superficial consideration and who believe that gas lamps should not be used except in locations where there is no roof above them. Dr. Rideal says: "The results of these tests have been carefully examined and averaged, and with few exceptions they absolutely fail to disclose any measurable difference between one mode of lighting and the other. Not only so, but in no case do they show any deviation from any normal conditions."

The exceptions noted above were in favor of gas, because of the better ventilation effects secured, due to the fact that the walls and ceilings of our rooms are very porous and constantly admit a large amount of fresh air, which the heating effect from the gas lamps is just sufficient to insure a proper circulation.

Another consideration which I believe has a very important bearing on the use of gas for illumination is due to the fact that it does not come under the classification of a luxury. In this country the dollar is most frequently the hallmark of quality. If you say a thing is cheap, it becomes very undesirable in the minds of many people, and if there is any one point admitted, it is that gas illumination is cheap. In fact, this has been so much talked about that it has resulted in a general depreciation and failure to recognize its advantages in other ways.

I have been told that in towns where natural gas is used many consumers have gone from gas to electricity because they did not have the nerve to call at the gas company's office at the end of a month and pay a bill of 15 or 20 cents for the entire month's lighting service. It was too cheap—they wanted to prove that they could qualify for the luxury class at least in illumination. This condition is present to a greater or lesser extent in all cities where artificial gas is used to-day. The high efficiency of gas illumination encourages a careless regard for results. In electricity, I believe the efficiency from the coal pile is from 5 to 10 per cent. In gas, using mantle burners, we get 60 to 70 per cent. of the energy from the coal.

When more gas companies realize the value to them of the lighting side of the business, it will be pushed harder, with correspondingly increased results. This condition is coming about rapidly, as gas companies and gas men all over the country are becoming more interested. The day is arriving when the unpiped house will be a serious reflection on the architect responsible for its design. The occupant of a house should not be deprived of the advantages of gas illumination in his home by the oversight of his architect.

In the matter of fixture design, lamps and glassware, you will find quite as great a variety with an excellence in design and workmanship equal to any available for electric lamps, provided you are willing to pay amounts not in excess of those demanded for good electric fixtures. I have a number of slides here illustrating many of these fixtures and many installations, together with some equally good electric installations, which are shown for comparison. [Great Applause.]

Here followed a most interesting and instructive exhibition of lantern slide illustrations, which were greatly enjoyed and appreciated by the meeting.

Discussion.

The President—If the gentlemen would like to discuss Mr. Macbeth's paper, it is before you for that purpose.

Mr. Davis—A short time ago, in reading a chapter of chemical history (it was the history of some of the experiments carried on by Prof. Bunsen, probably one of our greatest research chemists), I found that he had carried on a series of experiments to determine the rapidity with which air actually did diffuse through the walls of an ordinary brick or wooden residence, with the result that through the average residence air would diffuse rapidly enough to actually displace the entire air content in the room at the rate of three times an hour. That is, all the air in the room was changed three times an hour, by actual diffusion, with all the doors and windows shut. That is rather a remarkable rate of diffusion. No doubt it is true. It has been proven by chemists who at the time, doubting his word, eventually succeeded in checking his results. We can then see that there would be very little danger from the small amount of gas in combustion in the gas mantles. Speaking of the amount of light coming from the artificial source of illumination, Mr. Macbeth stated that less than 5 per cent. of all the light was obtained, that only 5 per cent. of the total amount of energy used was converted into light, and that the gas light gave the largest amount. I might call attention to the light of the fire-fly, which is the only perfect source known. Probably some of you may have seen the record of experiments carried on in a German laboratory, in which was a thermometer capable of registering the one-thousandth part of a degree. They placed that against the fire-fly and no rise in the temperature occurred. Every bit of energy was converted into light. It occurs in the fire-fly, also in certain fish of which we know. It is phosphorescent in the body of the fish, but not in the water, which shows there is a possibility of actually converting energy totally into light, and it is being worked on all the time. It is a possibility and a hope that we will find some means of converting all of our energy into light, just as the fire-fly does. It has been done; why not again? As to the fire risk of gas compared to electricity. The week before Christmas a fire occurred in my house at an early morning hour. Up to 3 or 4 years ago our light had been gas, but the fire at my house was caused by defective electric wiring. Mr. Macbeth stated that nothing else helped out gas lighting much more than to use some of it. At our works we show visitors around. Scarcely a week passes that, in showing people around the works, they do not make the remark: "You use electric lights." Where there is danger of fire from the gas they use electric lights. Every other gas works does. I always try to explain that. That the gas would not be safe unless we had it inclosed in a very fine screen. That is a frequent occurrence. It is something that happens very, very often.

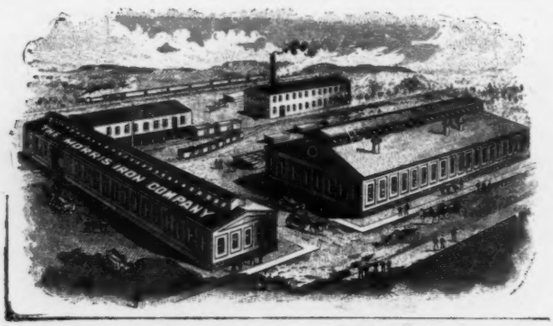
The President—I am afraid, gentlemen, I will have to close this discussion. I will say on behalf of the Association that we thank Mr. Macbeth for his kindness in favoring us with a very excellent address.

(To be continued.)

A Modern Plant in Connection with an Auxiliary Industry.

Recently the Morris Iron Company succeeded to the business theretofore conducted under and by the "Elmer P. Morris" Company, "The Firebrick Iron Works" and "The Montrose Iron Works," and now the proprietors of the amalgamated concern have wisely determined to reconstruct their manufacturing plant, to the end of largely increasing the output of ornamental posts, castings and other outdoor specialties, the plant of course to remain in the briskly growing section in and about Frederick, Md.

The plant, the general outlines of which are well shown in the illustration, will have a total floor space of 2½ acres, with direct tracks for connection with the Frederick Railway and the Pennsyl-



vania system. The boiler and power house will be equipped with McEwan boilers and Harrisburg-Corliss, direct-connected engine and "C. & C." dynamo. The lighting will be done by a General Electric, direct-connected engine, the estimate on such account calling for a 220-volt generater.

The foundry is arranged to carry a floor space measuring over 50,000 square feet for moulding purposes only. Connected thereto will be the usual sand-blasting, cleaning and chipping room. The foundry is being equipped with electrical traveling cranes, air and electric hoists, moulding machines and similar tools of modern type.

The machine shop is to have a dimension of 60 feet by 325 feet, and it will be equipped with traveling cranes, together with 20 machines for handling all kinds of high-grade work of that type.

The pattern shop will adjoin the machine shop, and this will be fully equipped with all necessary tools that go with modern methods. The pattern storage building will be 60 feet by 200 feet, and it will be of absolutely fireproof construction.

The warehouse and shipping department section as laid out covers 60 by 175 feet, and ample yard space is allowed for. Of course, an industrial railway system will be installed throughout the entire establishment. When the plant is in working order it will require 300 men to operate to ultimate capacity.

In addition to the line of ornamental poles, brackets and electric railway and lighting fittings, the Company will supply small castings such as: Building columns, plain and ornamental; machine tool castings; grate bars; manhole covers and frames, along with a general line of aluminals, brass, gray iron and semi-steel castings. The sales' office will remain in 91 West street, New York; but the general offices will be installed in a 2-story building, in which will also be located the drafting and designing department. The company's "Bulletin, No. 20," will soon be ready for distribution.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

985,015. Apparatus for Enriching Gas. E. A. Dieterele, Seattle, Wash.

985,038. Gas Stove. W. J. Kennedy, Grand Rapids, Mich.

985,175. Gas Pressure Reducing and Regulating Mechanism. J. B. Hirst, Chicago, Ills.

985,251. Annular Gas Furnace with a Central Pillar. C. Deselle, Paris, France.

985,261. Gas Lamp. A. H. Humphrey, New York City.

985,318. Lamp. O. A. Arneson, Chicago, Ills., assignor to Yale Manufacturing Company, same place.

985,580. Inverted Incandescent Gas Lamp. A. Giorgi, Florence, Italy.

985,662. Gas Machine. B. Darlington and J. M. Call, Vaughan, W. Va.; said Call assignor to said Darlington.

985,722. Regulator for Recording Gas Calorimeters and Analogous Instruments. F. G. Beasley, Smethwick, near Birmingham, England, assignor of one-half to Parkinson and W. & B. Cowan, Limited, Birmingham, England.

985,818. Water Regulator for Suction Gas Producers. E. Lundgren, Warren, Pa.

985,909. Coking and Gas Generating Oven. H. Koppers, Essen-on-the-Ruhr, Germany.

986,202. Vapor or Gas Generating Apparatus. W. N. Norwood, San Antonio, Tex.

986,300. Gas Lamp. T. J. Little, Jr., Woodbury, N. J., assignor to Welsbach Light Company, Gloucester City, N. J.

986,343. Gas Regulator. W. A. Baehr, Chicago, Ills., assignor to The Reliance Engineering and Manufacturing Company, same place.

986,344. Automatic Gas Regulator. W. A. Baehr, Chicago, Ills., assignor to The Reliance Engineering and Manufacturing Company, same place.

986,369. Gas Lighting Apparatus. R. M. Dixon, East Orange, N. J., assignor to the Safety Car Heating and Lighting Company.

986,374. Method of Working Updraft Gas Producers. J. Fielding, Gloucester, England.

986,432. Supporting Means for Globes of Inverted Incandescent Gas Burners and Like Fittings. A. Bray, Leeds, England.

986,495. Process of Making Gas. J. J. Nix, Alhambra, Cal.

986,638. Mantle Fitter's Tool. T. J. Little, Jr., Woodbury, N. J., assignor to Welsbach Light Company.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. HENRY K. MORRISON, whose management of the Concord (N.H.) Gas Light Company has resulted in such great advantage to the shareholders, has accepted the management of the Brockton (Mass.) Gas Light Company and took active charge Saturday last. The correspondent who informed us of this change writes the following, to which we heartily subscribe: "That Superintendent Morrison leaves with Concord's good wishes for success in larger fields, and the discharge of duties for which he is so well qualified, goes without saying. In the course of his administration here, he has kept the Concord Gas Company up to a progressive standard, steadily broadened the plant and witnessed a constant expansion of the business."

THE Public Service Commission of the Second New York District heard testimony last Saturday in support of the petition of the Rockland (N. Y.) Light and Power Company to lay pipes in and through the highways of Grand View and Piermont. There is no doubt that the permission will be granted, and there is no room for doubt at all as to the truth of the statement that Piermont should have had gas at least 10 years ago.

AT the annual meeting of the Middletown (Conn.) Gas Light Company the following officers were elected: Directors, W. F. Burrows, W. G. Pardee (added to the Board), S. D. Clark and H. L. Mansfield; President, W. F. Burrows; Secretary and Treasurer, H. L. Mansfield; Superintendent, S. D. Clark.

THE proprietors of the Defiance (O.) Gas and Electric Company have arranged an extensive scheme of betterment on the gas division of their property, and it surely was not too soon. The expenditure connected with the scheme is set at $15,000, and we venture the prediction that a better step was never taken by the Defiance folks.

IT looks to us that the authorities of Bridgeport are about experienceing a change of heart over the public lighting of that sprightly city. The present contract for the lighting of the streets (it was a 5-year period agreement) is drawing to a close, and the present contractors (the American Street Lighting Company) have submitted a bid for continuing the work for another period of 5 years. Their pricing was $25 per lamp per annum—that price is the agreement one in effect—but the Welsbach Lighting Company of America, is a competitor at the upset figure of $28; these figures as to both include lighting and extinguishing. Now, while the bids are $3 apart, in view of the experience, as to outages and other indispositions in respect of the service rendered by the existing contractor, the authorities are showing decided premonitory symptons of awarding the contract to the Welsbach folks. Good service certainly counts; and good service is certainly rendered in every instance by the Philadelphia-Gloucester combination.[1]

THE Crown Gas Light Company, of 27 West 42d Street, New York city, is now marketing both an indoor and an outdoor inverted gas lamp which operates upon the down-draft or regenerative principle. These particular lamps are patented, and, therefore, of original design; but this type of lamp has had large success in Europe in both large and small types, and in this country in the former types. The large majority of the single burner inverted lamps which are in use here do not employ this design, but undoubtedly will come into greater favor in the future.

MRS. SARAH WOODWORTH CRAIG'S current engagement in the lecture field is at Columbus, O., where, under the patronage of the local gas folks, she began a series of lectures commencing the 26th of March and ending to-day. Advices from that point, dated March 29th, go to show that the housewives of the capital of Ohio are very much interested in the matters which Mrs. Craig can and does so aptly describe.

"THE opening of the new meeting and recreation rooms of the Lynn[s] (Mass.) Gas and Electric Athletic Association, which was

1. Since this was written the authorities yielded to the figures and awarded the contract to the lowest bidder.

ormally brought off the night of March 23d, was a signal success. The rooms, which are in the handsome, modern Lynn structure, known as the 'Sagamore Building,' are finished off in excellent taste, and every arrangement possible for the instruction, comfort and pleasure of the members is in positive evidence. There are card tables for those inclined to deal the ornamental bristol boards that number 52, pool tables for those who fancy wielding the cue, chess and checker boards for those who mingle their chance work with mathematical thought, magazines, books, newspapers, etc., for the studious, albums loaded with views for the artistic, and a gas kitchen outfit, wherein and wherefore the succulent stew, the savory oyster and clam, the sizzling chop or steak—in fact, where edibles of any sort may be prepared for the delectation of the palate or for the staying of the appetite. Of course, it is an all-gas kitchen, and the illumination of the apartments is a veritable dream of light. Take it all-in all one cannot fail to remark, having looked it over carefully and then let thought get in its work of review, to reach the noting: 'And all this is to be traced to a Company, whose main spirit is said to be the most calculating man in all New England—Mr. Charles F. Prichard.' Yes, 'C. F. P.' is likely a calculating man—his career here certainly proves it—but word-demonstration is no positive sign of forethought for others, of practical exemplification of the humanness that brings man to man, that shows how close the 'boss' is to his 'gangs.' In fact, it would be well for every body corporate if the main spring thereof were closely fashioned after the Prichard sort.—L. V. R."

THE Fitchburg (Mass.) Gas and Electric Light Company has just installed a range of the Garland type in the noted restaurant of that city known as the "Bon Ton." The range is 6 feet over all, and carries two ovens, each 24 inches wide. It is equipped with all the necessary adjuncts, such as broilers and the like; and as further auxiliaries its connections number and include an automatic gas water heater and a large warming closet.

THE headquarters of the Luzerne County (Pa.) Gas and Electric Company are to be removed from Plymouth to Kingston. The Company will occupy a 3-story building on Wyoming avenue, and will include a modern equipment for the proving of gas and electric meters.

"E. A. N.," writing under date of the 27th inst., says: "On Saturday, March 25th, 200 members of the Municipal Engineers' Society, of the City of New York, as the guests of the Consolidated Gas Company, visited the plant at Astoria. The Society boarded the steamer at the foot of East 42d street, at noon, and, during the sail up the East River to the works, lunch was served. On arriving at Astoria they were received by Messrs. George E. Woods, W. F. Lawrence and Jac. Shaw, under whose guidance they inspected the works. Before the return the shaft of the new tunnel, which penetrates through solid rock to a depth of 225 feet, was visited. Automobiles were provided for those wishing to return before the steamer started on the home trip, booked for 4:30 P. M. The excellent arrangements made were planned and carried out under the direction of Mr. Colin C. Simpson, General Superintendent of Mains."

MR. J. C. STERN, the clever President and active man in connection with the operation of the Amarillo (Tex.) Gas Company, writing under date of the 25th March, says: "Our young city and our gas business as well are still making headway. Our 1910 gas sendout was about 15 per cent. in excess of 1909, and we did not do much in the new business department either. This year we expect to make still greater headway."

MR. F. L. MARSHALL, Manager of the Hampton, Phœbus and Fort Monroe Gas Corporation, of Hampton, Va., informs us that the Company has made a contract with the National Soldiers' Home to supply it with gas. It is to be used all through the quarters, particularly in the kitchens, although the arrangement covers the officers' quarters, mess halls, the hospital and other departments. The entire piping for the installation will be done under the supervision of and be paid for by the authorities.

MR. FRANK MAPLE, the sapient gentleman who manages the offices of the Boone (Ia.) Gas Company, informs us that, commencing the 1st inst., the selling rate will be reduced from $1.50 to $1.30 per 1,000 cubic feet. Those who use less than 5,000 cubic feet per month will receive a discount of 10 cents per 1,000, and those who consume over 5,000 cubic feet per month will receive a discount of 15 cents per 1,000. All discounts to be conditioned on payment of bills within 15 days from the dates thereof. Mr. Maple, in further stating the case, says: "This reduction of rates is based upon present annual sales of 35 millions cubic feet. When the annual sales reach 40 millions cubic feet a further reduction of 5 cents per 1,000 will be made; and when the annual sales reach 60 millions, a still further reduction will be announced."

THE Westinghouse Electric and Manufacturing Company has received an order for oil well motors that is justly causing the "Publishing Department" of that leviathan concern much mental activity, its sales' department is "swelling with pride," and its factories are bubbling over with motion. The order comes from Kern River (Cal.) Oilfields Company, Limited, and it calls for 100 motors to be used in the cleaning up of the oil wells that need scouring for the better development of its output. The motor adopted is of the back-geared type, and a pulley on the countershaft drives the main belt.

AT the Experimental Station, U. S. Mines' Bureau, Pittsburgh, Pa., as we are informed by Dr. J. L. Cochrane, several trial runs have been made with an experimental gas producer, using coke as fuel, with which limestone had been mixed in varying proportions, the purpose being to flux the ash and form a liquid slag, thus avoiding clinker and ash and consequent shutdowns. Liquid slag has been readily made which runs freely from the producer. The high temperatures necessarily needed, according to the official statement, in the production of gas, are easily maintained

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THE new 10 million capacity holder, which the Riter-Conley Company is constructing for the Laclede Gas Light Company, of St. Louis, is to be completed by October 1st, which would seem to be "going some."

THE voters of Escanaba, Mich., will to-day ballot on the proposition to authorize the authorities to bind the city in the further sum of $30,000, the proceeds of the binding to go towards the construction of a gas plant to be operated on municipal account. This project will undoubtedly carry, in that it has behind it the entire favorable sentiment of the Business Men's Association, the Mayor, the Common Council and the newspapers.

"P. W.," writing from Milford, Mass., under date of the 27th inst., says: "I notice that you recently reported that Mr. Ellsworth J. Nutter, Superintendent of the gas division of the Milford Electric Light and Gas Company since 1887, had resigned. Mr. Nutter did not resign; he was discharged. It is true that the General Superintendent of the Massachusetts Lighting Companies asked Mr. Nutter to resign, without assigning any reason therefor. Naturally, Mr. Nutter resented the demand, which on its face was an erratic movement, so in sequel came the peremptory request. There is often in evidence matter tending to show that all sorts of executive ability manifestations crop out in State street, up Boston way."

MR. JNO. E. GILL, expert accountant for the Corning (N. Y.) Glass Works Company, since his resignation in 1908 from the service of the Corning Electric and Gas Company, has been appointed to a responsible position on the staff of the New England Engineering Company, with headquarters in Waterbury, Conn.

THE gas rate at Bristol (R. I.) has been put at $1.35 per 1,000 net, a concession of 10 cents.

THE following extract, from a decision of the Massachusetts Board of Gas and Electric Light Commissioners, in the case of the Master Plumbers' Association, of Lowell, Mass., against the Lowell Gas Light Company, shows the salient features of the case, and also shows that the Board has the courage of its convictions, which is all the more praiseworthy in that the aforesaid Association is quite a political power in Lowell:

"In this particular case the Board is satisfied that no public interest has suffered, and that the acts of the Lowell Company which have deprived the Master Plumbers of a possible profit, have, on the other hand, operated to the immediate advantage of the purchasers of gas appliances and indirectly to the advantage of all gas consumers in Lowell. If, however, the Board is wrong in its opinion that the Company's acts are within its corporate powers, and if the private rights of the Master Plumbers, or any of them, are injured or put in hazard thereby, they have a clear remedy against the Company in the courts on their own initiative."

THE AMERICAN GAS LIGHT JOURNAL

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MONDAY, APRIL 3, 1911.

The Market for Gas Securities.

No change is reported in the quoted values of Consolidated gas since last Friday. The opening to-day (March 31) was made at 145⅛ to 146; the closing Friday week was 145¼ to 145⅞. The suggestion that the Consolidated Gas Company had purchased a large block of stock of the Brooklyn Union Gas Company has been met with a flat denial. This suggestion that the Consolidated Company is looking to absorb the Brooklyn Union is a trifle ridiculous. The controllers of each know the value of their respective properties, and there never can be any conflict between them. Possibly 25 years from now they *might* come together.

Peoples, of Chicago, has stiffened some, and Lacledes are softer, owing to the consummation of the capital readjustment. The general gas share market favors the holder.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

APRIL 3.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	145½	146
Central Union Gas Co.— 1st 5's, due 1972, J. & J.	3,000,000	1,000	102	103
Equitable Gas Light Co.— Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,600,000	100	155	165
New Amsterdam Gas Co.— 1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98¼	100¼
New York and East River— 1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	100	102
Northern Union— 1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	140	142
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅝	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000		89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	103	103½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	200,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	103⅝	103¾
Preferred	2,500,000	100	91½	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co. " 1st Mtg. 6's	400,000	1,000	106	108¾
Massachusetts Gas Companies, of Boston	25,000,000	100	92¼	92¾
Preferred	25,000,000	100	97¾	98
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	107⅜	108
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104⅛	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.— 1st Mtg. 5's	1,000,000	1,000	100	102
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,800,000	200	399	400
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

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The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable April 15, 1911, to stockholders of record at the close of business, March 31, 1911. Checks will be mailed.

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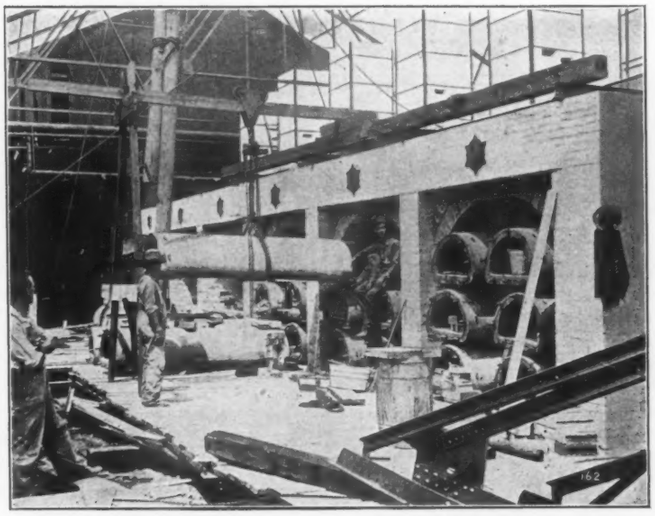

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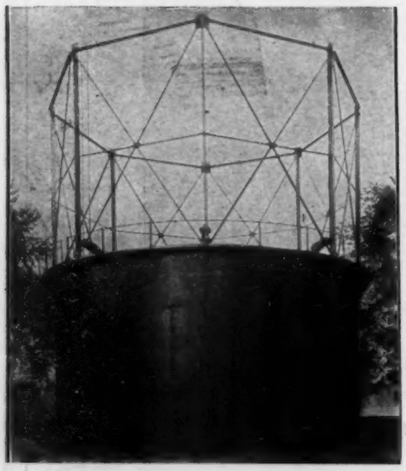

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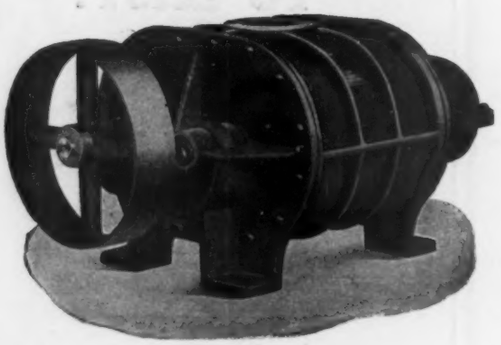

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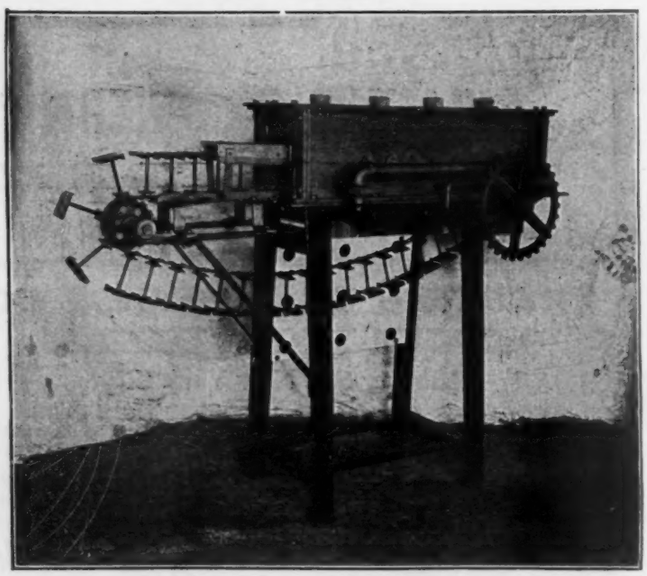

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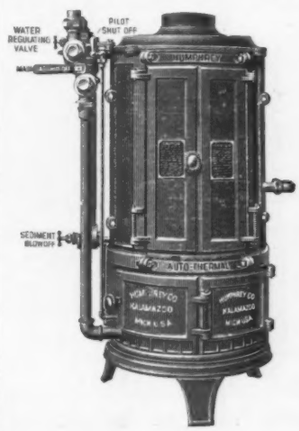

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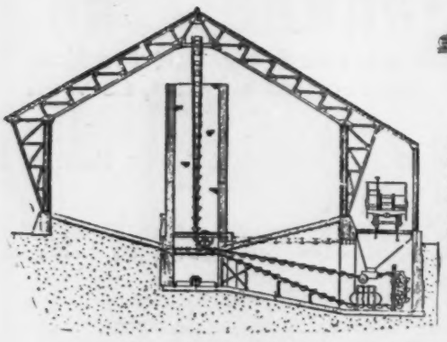

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MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 18, 19, 20, 21, 1911. St. Louis, Mo. Officers: President, Donald McDonald, Louisville, Ky. Secretary, A. B. Beadle, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1911. ————. Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1911. New York City. Officers: President, C. R. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, H. E Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Oct. Chicago, Ill., 1911. Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 36 West 39th street. New England, Secretary, W. S. Farrow, 1200 Massachusetts avenue, Cambridge, Mass. Philadelphia, Secretary, G. B. Muth, 1000 Chestnut street Chicago, Secretary, F. H. Bernhard, Marquette Building.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, June, 1911, ————. Officers: President, Austin Burt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, Sept. 20, 21, 22, 1911; Detroit, Mich. Officers: President, A. P. Ewing, Detroit, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine; Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December 5-12, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May 16, 17 and 18, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Columbus, O. Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1911; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1911, Oakland, Cal. Officers: President, F. A. Leach, Jr., Oakland, Cal.; Vice President, W. Baurhyte, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 12, 13, 14, 1911, Reading, Pa. Officers President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

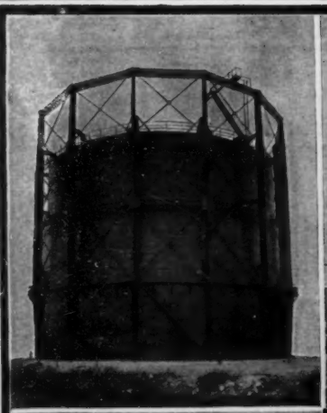
Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, Waterbury, Conn.

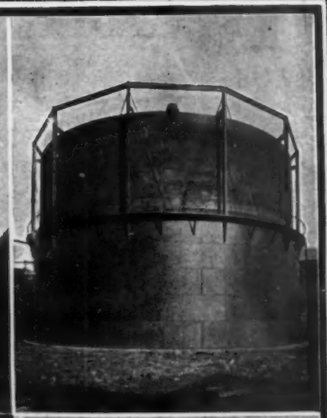
Southern Gas Association.—Annual meeting, April 19-21, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 27, 28, 29, 1911; Houston, Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, D G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 17 and 18,, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

Directory of American Gas Companies, 1910. Price, $5.00. For Sale by American Gas Light Journal, 42 Pine St. N. Y. City.





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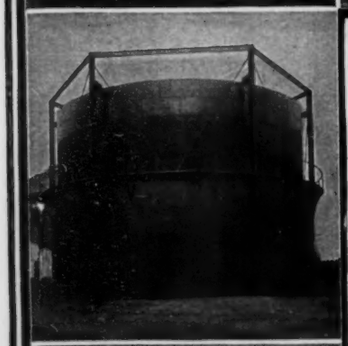
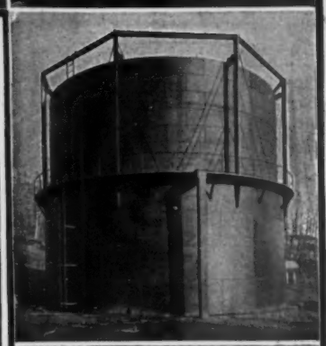
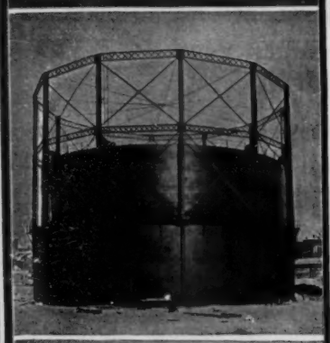

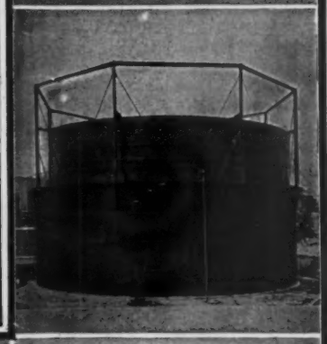
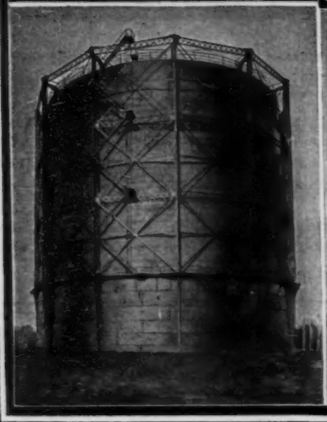
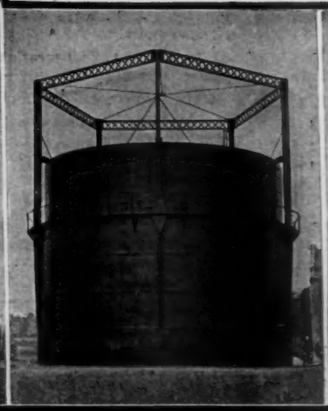

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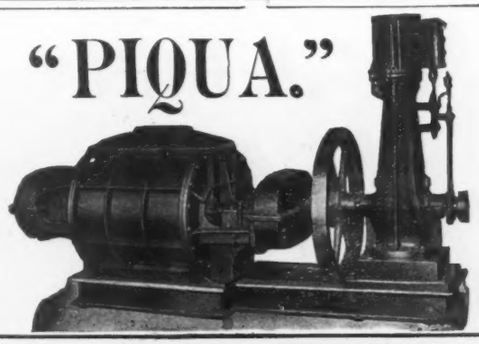

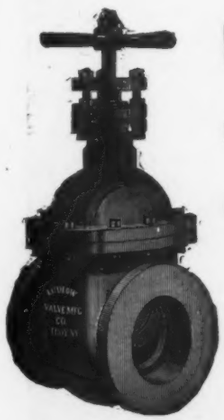

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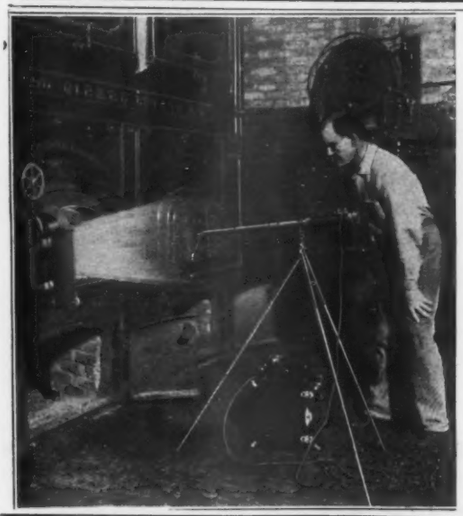

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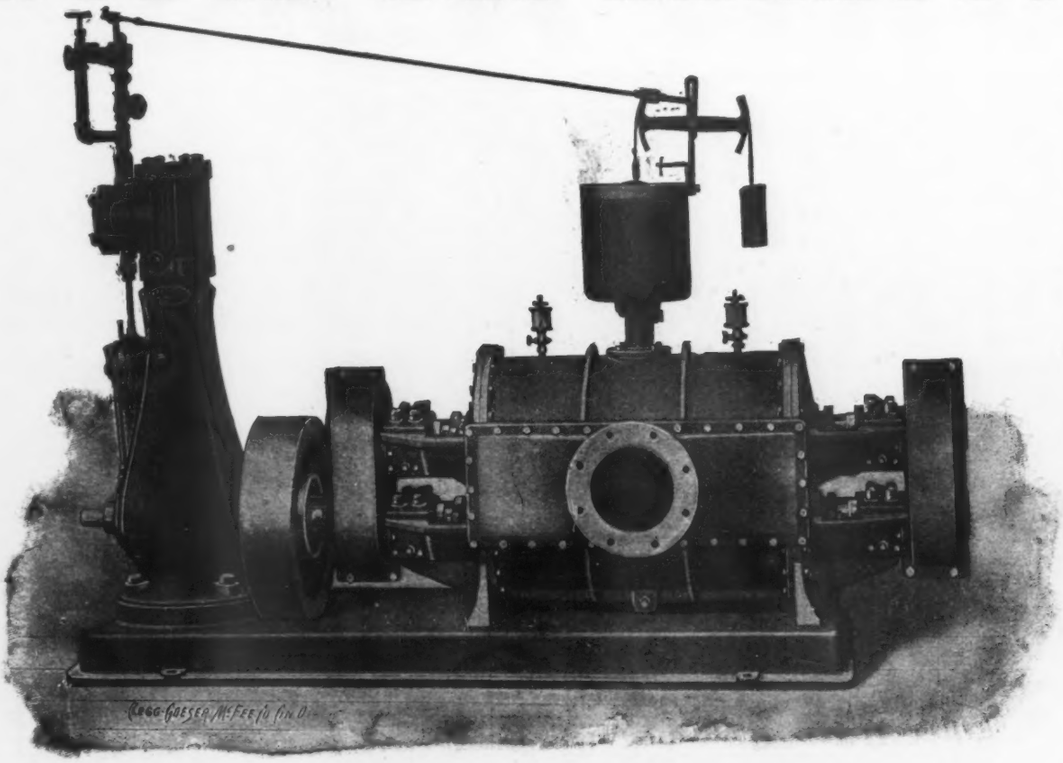

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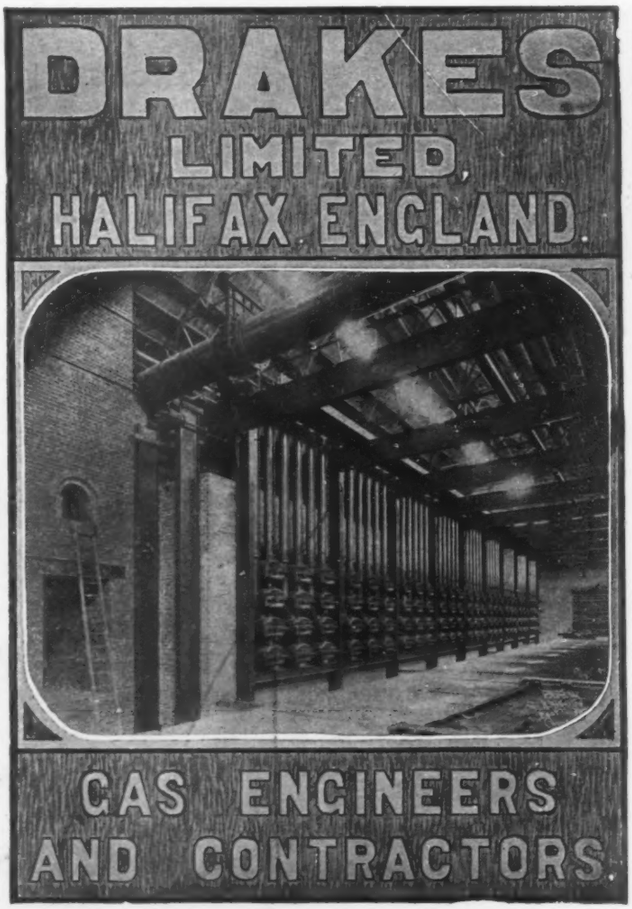
Day of Week.	MOONLIGHT SCHEDULE.		
	Date.	Light.	Extinguish.
Saturday	1	6.50 P.M.	4.50 A.M.
Sunday	2	6.50	4.40
Monday	3	6.50	4.40
Tuesday	4	12.00	4.40
Wednesday	5	1.00 A.M. F.Q.	4.40
Thursday	6	1.50	4.40
Friday	7	2.30	4.40
Saturday	8	3.30	4.40
Sunday	9	3.00	4.30
Monday	10	3.50	4.30
Tuesday	11	4.10	4.30
Wednesday	12	No L.	No L.
Thursday	13	No L. F.M.	No L.
Friday	14	No L.	No L.
Saturday	15	7.10 P.M.	10.00 P.M.
Sunday	16	7.10	11.00
Monday	17	7.10	12.00
Tuesday	18	7.10	1.00 A.M.
Wednesday	19	7.10	1.50
Thursday	20	7.10	2.30
Friday	21	7.10 L.Q.	3.10
Saturday	22	7.10	3.50
Sunday	23	7.20	4.10
Monday	24	7.20	4.10
Tuesday	25	7.20	4.10
Wednesday	26	7.20	4.10
Thursday	27	7.20	4.10
Friday	28	7.20 N.M.	4.10
Saturday	29	7.20	4.10
Sunday	30	7.20	4.00



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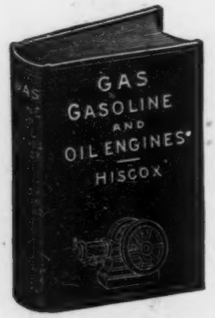

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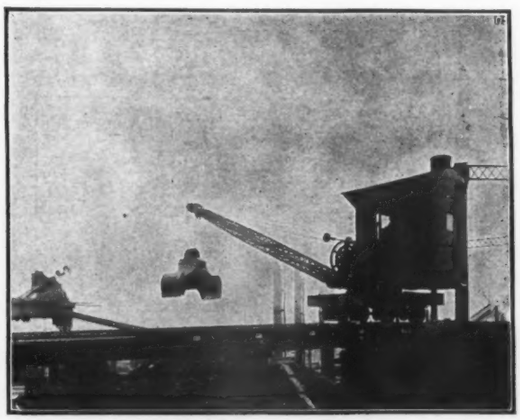

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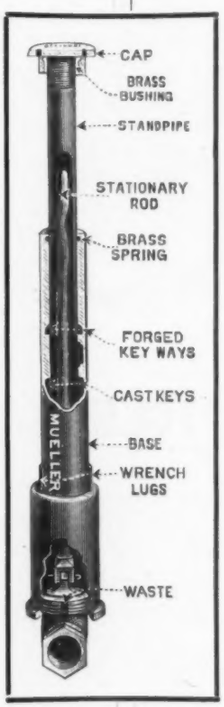

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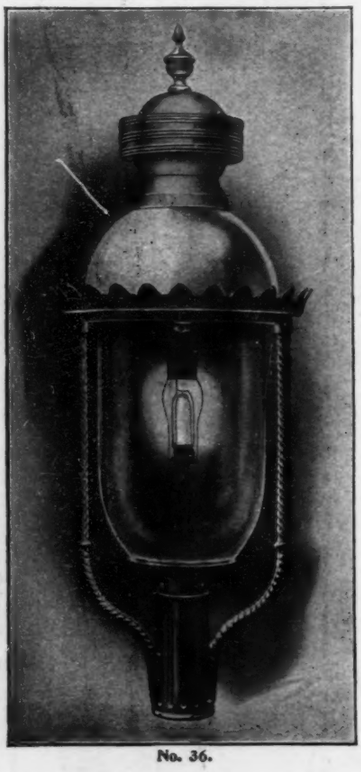

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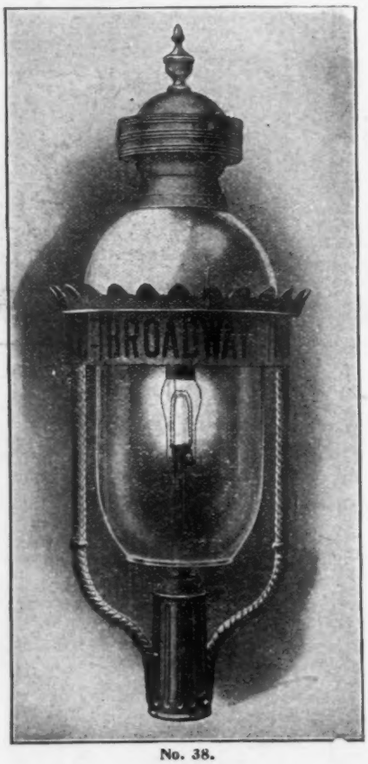

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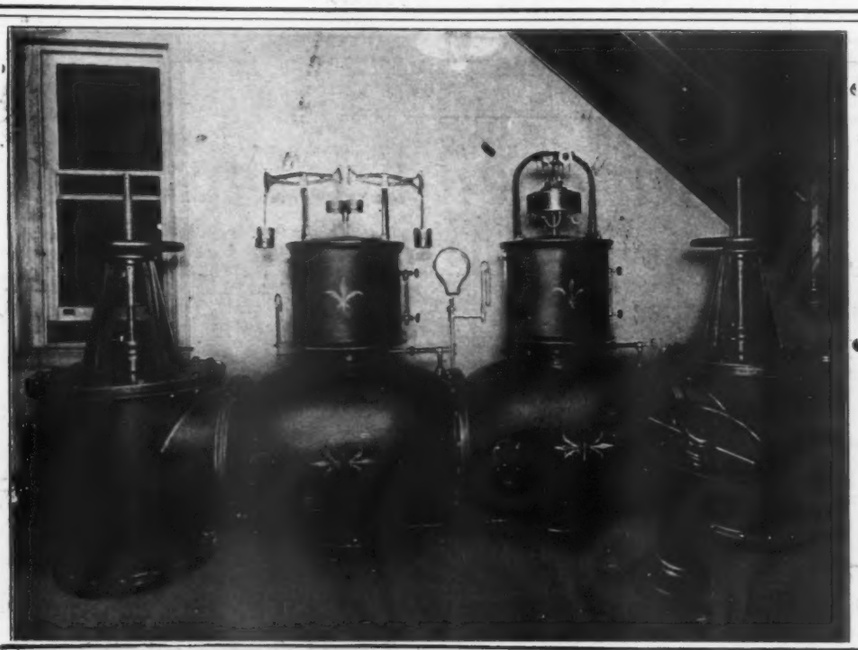

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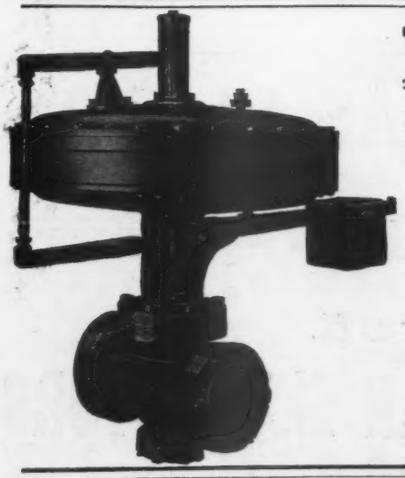

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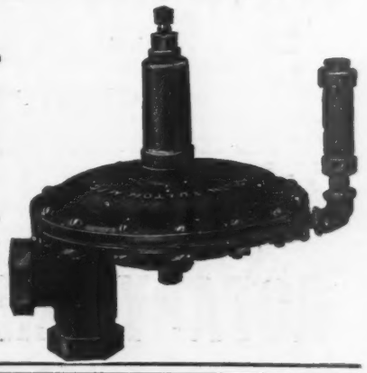

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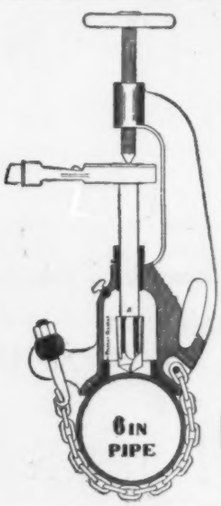

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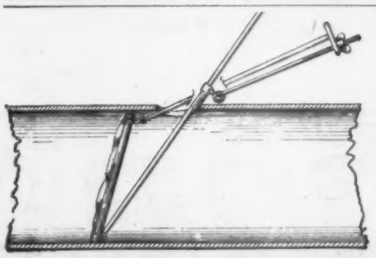

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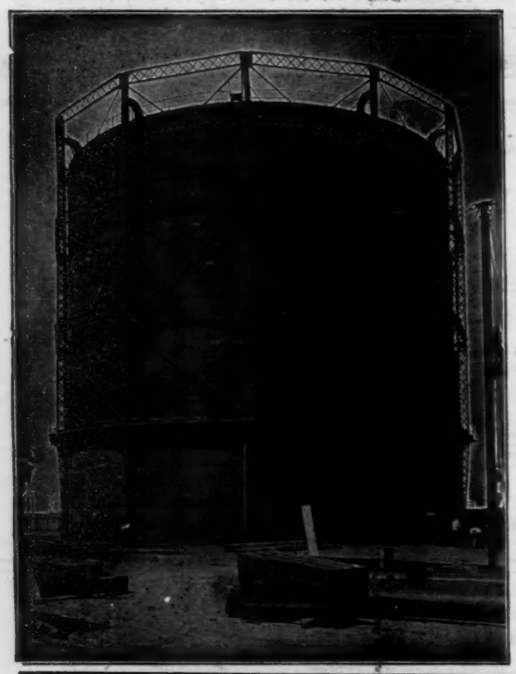

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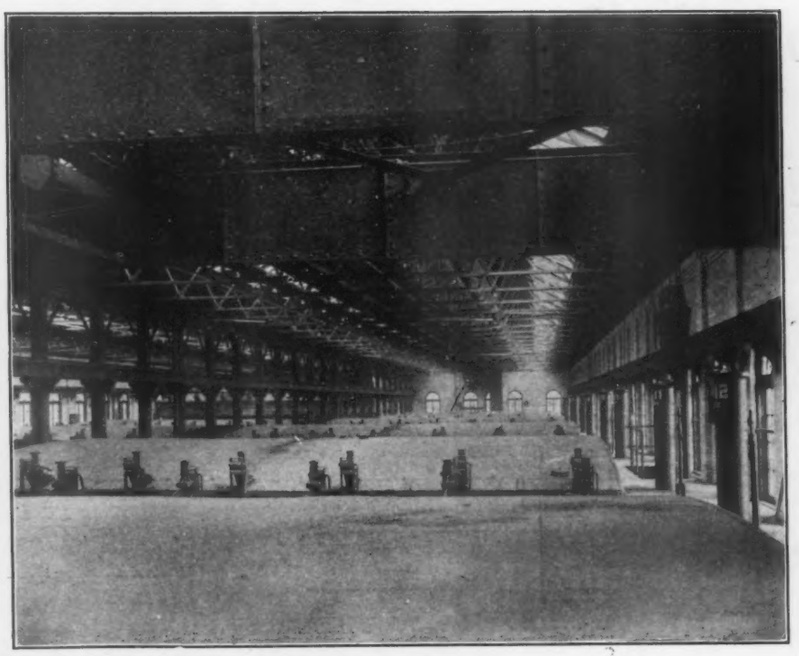

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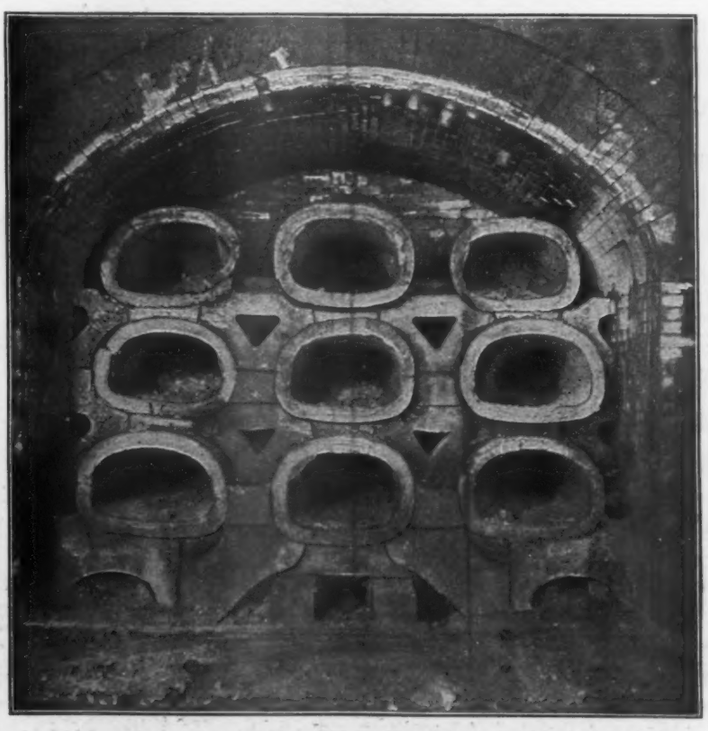

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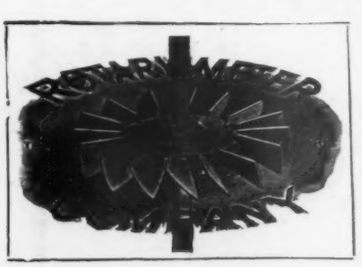

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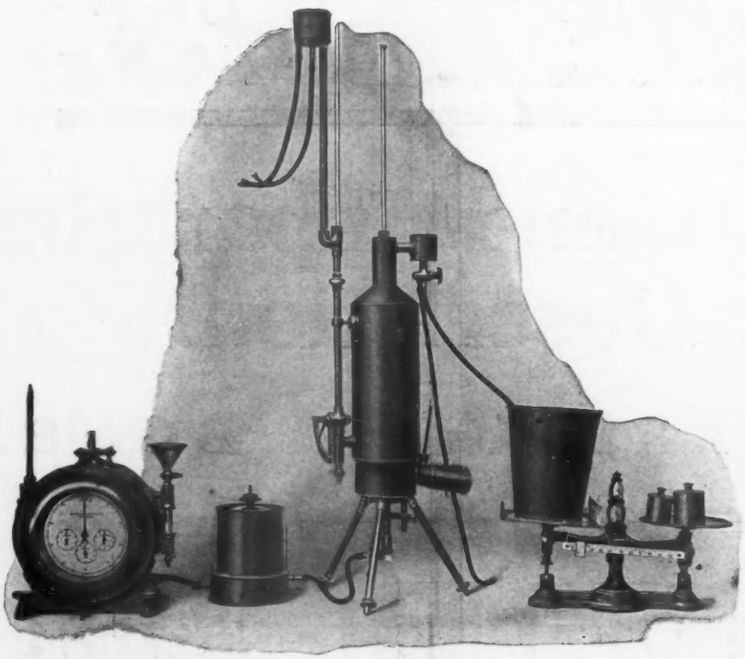

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